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A MEASUREMENT OF BRITISH INDUSTRIAL PRODUCTION

I. INTRODUCTION

THE editor of the *London Economist* said in 1926, "It is an amazing fact that we cannot today say with certainty whether [British] national production is ten per cent below the pre-war line of 1913 or about equal to it. Yet it is of utmost importance to know this in arriving at conclusions as to the forces which are . . . . deciding our industrial policy."[1]

Indeed, a wide variety of questions about British industry—theoretical as well as practical—still demand an accurate index of production for that country.[2] No census of production was published,[3] however, in the seventeen years between the first one in

[1] W. T. Layton, *Journal of the Royal Statistical Society*, XC, Part II, 260.

[2] On the practical side, decisions as to taxation, tariffs, credit policy, the effect of unemployment insurance, and the extension or contraction of state intervention in industry are a few of the issues which need measures of production for intelligent decision. On the theoretical side, the relation of real wages to production, the possibility of increasing wages at the expense of other shares, and the relation of unemployment to Britain's export trade, all demand an index of production for their solution.

[3] A census was indeed taken in 1912, but its results were never tabulated, owing to the outbreak of the war. Such of the 1912 returns as are available are stated in the 1924 census reports by way of comparison.

1907[4] and the recently published results for 1924.[5] Consequently, this information has been surprisingly deficient.

Since the publication of the 1924 census reports, there has been a new opportunity for studying the question, and one index of 1924 production has been made by the Balfour Committee on Industry and Trade.[6] As will be shown, however, this estimate leaves much to be desired. Its result is far out of line with previous estimates,[7] and its method is both highly questionable standing by itself and is unsuitable for securing the details by industry which are essential to a full knowledge of the situation.[8]

It seems appropriate, therefore, to construct the best index possible for general purposes from this new information, to compare this with previous estimates, and to examine the chief findings laid open by such an index. Such is the purpose of this article. First, however, it is necessary to examine what is meant by an index of production and to set up the formula that will be used for measurement.

II. FORMULA

In many cases of indexing, it may be assumed that any approximation to the concept to be measured will give results quantitatively near the truth. Unfortunately, this is not true for the problem in hand. Information is available for but two years,[9] and

[4] Great Britain, Parliament, "Final Report of the First Census of Production of the United Kingdom (1907)," *Accounts and Papers* (1911–13), Vol. CIX, Cmd. 6320.

[5] Published originally in preliminary reports, Nos. 1 to 30, issued as supplements to the *Board of Trade Journal* between February 24, 1927, and January 5, 1928, entitled, "Third Census of Production, 1924." We shall not be concerned with the similar reports on Northern Ireland which appeared subsequently. All these preliminary reports are obtainable as separate reprints from H. M. Stationery Office.

[6] Great Britain, Committee on Industry, Trade, *Further Factors in Industrial and Commercial Efficiency* (1928), pp. 52–67.

[7] Although corroborated by this study (cf. Table II, p. 13). [8] Cf. p. 10, *infra*.

[9] Our problem would not be quite so difficult if we had data on the intervening periods between the first and last years. As the number of divisions of our total period increased, those disturbing changes which are a function of time would be negligible, since the lapse of time during each period of comparison would approach zero. We might in such a case link these intermediate comparisons so as to cumulate the changes in production which we wished to measure, while not doing so for the disturbing factors.

these two single points of comparison are separated by seventeen years of rapid change which resulted in very divergent movements of the separate commodities to be indexed. Selection of the particular formula thus becomes a crucial matter.

It is commonly recognized that a valid index of production must be independent of changes in the general price level. Comparisons of aggregate sale value[10] produced by industry have thus been generally rejected as measures of production because they include this disturbing price element. Realizing this, many have concluded that an index of production should measure "physical volume," and thus avoid the pitfalls of value relationships.

This counting of physical units is, of course, the method that would be used if only one type of goods were to be measured. So long as every unit to be counted has the same significance for any practical purpose, the physical measure is as good as any. But whenever a true index problem is present, various *kinds* of goods have to be aggregated together. It then becomes vital to select the *particular aspect* of the goods, common to all types, which one wishes to measure. An index is, indeed, a quantity statement about this common quality. The selection of the specific quality or common denominator of the group one wishes to measure, is, therefore, the controlling issue in determining the best method of weighting.[11]

The selection of this common quality among the various components of an index should be controlled by the purpose of the index. It would be possible, of course, to aggregate the number of *pounds* of all goods produced, and thus secure one sort of in-

[10] That is, a summation of the price of each good times the number of units of it produced. "Total expenditure," "total exchange value" (cf. Taussig, *Principles*, 2d ed., I, 128), and occasionally "gross (national) income" are terms used to mean the same thing (cf. note 17, *infra*). The British census calls this simply, "sale value," and we have adopted that term.

[11] This approach contrasts with the attempt to discover an ideal index for all purposes, selected because it possesses a set of formal statistical properties; e.g., Irving Fisher, *The Making of Index Numbers* (Boston, 1922). The identity of our final formula with his is the more interesting because of this difference in initial viewpoints.

dex of the "physical volume" of production.[12] But the result would have very little significance for most economic and social problems.

What aspect of the goods produced *is* of the most general social interest? Speaking in common-sense rather than in technical terms, the significant aspect of production as a whole is its want-satisfying power. No one can pretend to measure this accurately, but we believe that the best practical measure is the relative exchange value of the different goods as expressed in the market in terms of price. Relative changes in the marginal want-satisfying power of goods, at least, are likely to be reflected best in market prices even when these measure incompletely the absolute amounts of satisfaction.[13] Hence the common objective characteristic of goods we shall have to index in measuring general production is their value aspect. *Relative values* of the different goods, therefore, are just as important for our purpose as the physical volume of each type of goods itself.[14]

As an approximate measure of this common-sense concept, then, we shall define a change in national production as *any change in the (market) value of work done to goods (in value*

[12] This is the sort of formula that a "physical" index would seem to imply. But the indices of "physical volume" just referred to in the foregoing are not physical in this sense at all (cf. p. 6, *infra*).

[13] (1) Because of individual differences in wants and sensitiveness to the means of satisfying them, and (2) because the exchange mechanism is influenced by the inequality of incomes which makes the dollars of the wealthy stand for less want-satisfaction than those of the poor.

[14] Total production obviously increases *caeteris paribus* with any increase in the physical volume of any type of goods. But an increase in production may be caused just as surely, without any change in the total physical volume at all—by increases in those goods which man values highly, offset by decreases in the physical output of other goods. For example, a 50 per cent decrease in the number of wagons turned out along with a 50 per cent increase in motor-car production would result in the same physical total of vehicles. But there would be a net increase in production—i.e., want-satisfying power—as between the two years because of the higher value per unit placed on the motor cars.

This is not to deny that other definitions of production may be more useful for specific purposes. Thus in the work which one of the authors has done in trying to arrive at a mathematical theory of physical production, it has been thought advisable to exclude from the index of physical product the influence of the changing relative value of the respective commodities.

added) in so far as that change has not been caused by alterations in the standard of value itself.

Over a period of time, the relative values of the various commodities will change and these changes can be allowed for in either one of two ways:

1. Our definition, on the face of it, suggests using *aggregate sale value* for each of the two years to be compared, and deflating the ratio thus obtained by an index expressing any change in the general price level. This was the method followed by the Balfour Committee.[18] The difficulty is that the index of prices itself is based on a number of price comparisons. Ideally, these should apply to the identical goods whose production is being indexed, and they should be weighted by that fraction of total production represented by each type of goods. This weighting will be different in the second year from the first, and hence a varying system of weights—besides data on individual prices—is necessary to get an accurate price index for the purpose.

2. If we start with the *physical production* of each kind of goods, we can weight these separate ratios, changing the weights as their relative values change. If successfully done, this amounts to exactly the same thing as the first method. It, too, expresses the comparative value of goods in each year without being disturbed by changes in the absolute level of the value standard. This second method is most applicable to the bulk of the British data, and hence forms the starting-point for our formula.

Our ratios of physical production are to be weighted according to the market valuation of each type of goods considered. Prices are unsatisfactory as weights, however, because the difference between a high and a low price may be controlled by the merely accidental relative size of the commodity unit being priced in each case. If, instead, the aggregate sale value is used as a weight, an automatic correction for this is incorporated. The larger the unit priced in any one case, the smaller will be the number of units in the national output.[19]

[18] Committee on Industry and Trade, *op. cit.*

[19] If we are to use total sales value (marginal demand price multiplied by the number of units sold) as our weight instead of price per unit, another defect of our method of measuring want-satisfaction must be noticed. This arises from the dif-

If we assume for a moment that no changes in value occurred during the period studied, we could use weights of the first year alone. Weighting by total sales value, we should then obtain:[17]

$$\frac{\Sigma\left(\frac{q_1}{q_0}\right)v_0}{\Sigma v_0}$$

This is the formula usually called an index of the "physical volume" of production. It is not a physical index in any thoroughgoing sense, because it uses value weights. But, although taking values into account, it gives no effect to the comparative values of goods in the second year. If these changes in value are significant—as in our stretch of seventeen years they surely are—some method must be devised for incorporating them.

We may construct an exactly similar formula to use weights of the second or terminal year of our comparison. But in doing so it will be more appropriate to use the terminal rather than the beginning year as the base year of the index.[18] The similar formula giving effect to 1924 values in place of those of 1907 is:

$$\frac{\Sigma\left(\frac{q_0}{q_1}\right)v_1}{\Sigma v_1}.$$

In order both to give effect to the change of values and to the change in physical output, an average of these two obviously suggests itself. This is not possible so long as one is expressed as a

ferent possible shapes of demand curves, especially those to the left of the point of equilibrium. The result is that the total area under the curve which might otherwise be an indication of want-satisfaction is not necessarily proportional to the rectangular area representing total sales value. The indeterminate remainder is the roughly triangular area which Marshall took to indicate *consumer's surplus*. The individual errors arising from the shifts from one shape of schedule to another, however, probably go far to offset each other.

[17] q = physical quantity produced of a single good; v = aggregate sale value produced of the same good; subscript o indicates the first year in the comparison; subscript 1 indicates the second year in the comparison.

[18] This is a special form of the general rule that magnitudes must be expressed in the same type of units before they can be averaged. If London production is being expressed in terms of that of Paris (Paris base), the weights of Paris and not those of London must be used in order to be consistent. Cf. Fisher, *op. cit.*, pp. 270–76.

relative of the 1907 production, while the other is expressed in terms of 1924. When the values for the two years have been derived, either year may be used as a point of origin. It is more convenient perhaps to express both terms as percentages of the initial year. The formula using terminal year (1924) weights needs, then, to be inverted, producing a harmonic average:[19]

$$\frac{\Sigma v_1}{\Sigma\left(\frac{q_0}{q_1}\right)v_1}.$$

This last expression and the first one quoted have now to be averaged. And if a geometric mean is used, the whole formula will be made reversible without any upward or downward bias.[20] The complete formula then becomes:

$$\sqrt{\frac{\Sigma\left(\frac{q_1}{q_0}\right)v_0}{\Sigma v_0}\cdot\frac{\Sigma v_1}{\Sigma\left(\frac{q_0}{q_1}\right)v_1}}. \qquad (1)$$

This is the formula for production we shall use, because of its approximation to the logical concept of production we have outlined. It is algebraically identical with the celebrated "ideal" index number which Professor Fisher made so famous,[21] and

[19] If a geometric form of average had been used instead of the arithmetic, this inversion would produce a result numerically equivalent to an index calculated with initial-year base and terminal-year weights. This fact arises from the peculiar reversibility of the geometric average. It does not invalidate the above inversion of the arithmetic form. The arithmetic does give a different result according as the averaging is done before or after the point of reference is changed. Therefore it is necessary to average and then invert.

[20] That is, it will give a result when figured with the terminal year as base which is the exact reciprocal of that figured with an initial-year base. The upward bias of the arithmetic first term is exactly compensated by the downward bias of the harmonic second term.

[21] Aggregate value (v) in our formula is a product of price (p) and quantity (q) in the case of each type of goods. Substituting $p \cdot q$ for v in our formula, we have:

$$\sqrt{\frac{\Sigma\left(\frac{q_1}{q_0}\right)q_0p_0}{\Sigma q_0p_0}\cdot\frac{\Sigma q_1p_1}{\Sigma\left(\frac{q_0}{q_1}\right)q_1p_1}} \qquad (2)$$

(Footnote continued on next page)

hence has incidentally the formal advantages he has shown for that form of index.[22] The form developed is more convenient than Fisher's for use with census data, however, for it is not necessary to cross-multiply the price of one year by the quantity of the other. A single calculation of quantity ratios and their reciprocals has merely to be weighted in turn by the aggregate values for each of the two years.

III. GENERAL RESULTS FOR BRITAIN COMPARED WITH PREVIOUS INDICES

We are now ready to answer the query as to how large was British production in 1924 compared with that in 1907. Our definition of production is expressed in the formula which follows for reasons we have just examined:

$$\sqrt{\frac{\Sigma\left(\frac{q_1}{q_0}\right)v_0}{\Sigma v_0}\cdot\frac{\Sigma v_1}{\Sigma\left(\frac{q_0}{q_1}\right)v_1}}.$$

By applying this formula to the data of the 1907 and 1924 censuses,[23] we secure an index for 1924 of 123. This is a minimum estimate, since we used methods which would tend to understate

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Simplifying:

$$\sqrt{\frac{\Sigma q_1 p_0}{\Sigma q_0 p_0}\cdot\frac{\Sigma q_1 p_1}{\Sigma q_0 p_1}}. \qquad (3)$$

This is the form of index for quantities of production exactly analogous to Fisher's "ideal index" for prices. Cf. Fisher, *op. cit.*, pp. 3, 233–34.

[22] In essentials, what Fisher demonstrated was that this formula satisfied more closely than any other these two conditions: (1) It is consistent with the truism for individual items that $p \cdot q = v$. In this formula the p's and q's are interchangeable to give either a price or a quantity index. Notice that this means that the result would have been algebraically the same if we had used the first method suggested for our purpose (p. 5, *supra*), dividing aggregate sale value $\Sigma\left(\frac{v_1}{v_0}\right)$ by Fisher's index of price level (cf. note 35, *infra*). (2) It is a consistent formula from whichever point of time it is figured, the one ratio being the exact reciprocal of the other. For the data Fisher used, he estimated that the "instrumental error" in fulfilling these conditions was less than 0.8 per cent.

[23] The detailed methods and supplementary estimates necessary to do this are treated here in sections IV and V.

production in the latter year whenever an arbitrary choice has to be made. We may say roughly, then, that total production was one-fourth greater in 1924 than in 1907. Let us compare this estimate with the indices hitherto accepted.

The most systematic attempt[24] to estimate British production has been made by Mr. J. F. W. Rowe of the London School of Economics.[25] His published index for 1924 is 97.5. This index, however, includes agriculture, which does not concern us, and is calculated on a composite base of years 1907–13 instead of 1907 alone. His figures may be recalculated, however, and his result for industrial production in 1924 based on 1907 then becomes 98.1. Surely it makes a good deal of difference whether production declined 2 per cent, as most people have thus been led to believe, or has increased by about one-quarter, as our index indicates!

Our index is higher largely because we now have data for more commodities. The only complete production data available for Mr. Rowe previous to the 1924 census were for coal, pig iron and steel, and ship-building tonnage launched. All these are products of especially depressed industries. The lack was partly made up by some data secured from private sources, but also from export and import returns. The latter also underestimate production because of the particularly depressed condition of Britain's foreign trade, and because an increased product is now made from a given quantity of basic material imported, as compared

[24] There have been many impressionistic estimates, of course. For example, the *Westminister Bank Review* in 1923 estimated 1922 production at 22 per cent less than 1913, based on export and import returns. See criticism in the *Economist*, XCVII, 78. For an able criticism of several of these indirect methods of measuring production, see A. W. Flux, "An Index of Production," *Journal of the Royal Statistical Society*, XC, Part II, 226–38.

[25] He has published an annual index for the years 1907 to 1913 and from 1920 to date, and in addition a quarterly index since 1920. The quarterly index, which is independent of the annual and is based on less adequate data, will not concern us here. See London and Cambridge Economic Service, *Monthly Bulletin* Nos. 1, 4, 6, and 10 each year, 1923 to date. Also *Special Memorandum No. 8*, where Mr. Rowe summarizes his methods and results up to 1923. For general discussion, see J. F. W. Rowe, "An Index of the Physical Volume of Production," *Economic Journal*, XXXVII, 173–87.

to pre-war.[26] Our figures, on the other hand, are drawn from the Census of Production itself and hence are far more complete.

So great, indeed, was the disparity between Mr. Rowe's results and other indications of production, such as coal consumed, railway goods carried, and income tax returns that the editor of the *Economist* was moved to protest even before the 1924 census was available. Mr. Layton estimated that 1925 production was about equal to the "pre-war level of 1913," as against Mr. Rowe's figures, which show it to be 5.5 per cent below 1907 and 14.4 per cent below 1913.[27]

Perhaps it was Mr. Layton's criticism that led Mr. Rowe to say, in commenting on his tables, that his index might "register as much as five per cent too low" in post-war years.[28] It is not clear whether this correction would be sufficient to satisfy Mr. Layton or not.[29] Nevertheless, it is interesting to notice that the maximum index for 1924 which Mr. Rowe would have conceded is 103.[30] This substitutes a 3 per cent increase in production for the 2 per cent decrease which his table itself indicates. But even this is hardly more than one-eighth the increase which is shown by our index of 123.

If the statement of Mr. Layton quoted in the foregoing be given an interpretation most favorable to a high 1924 index, then his guess comes much nearer to our result. It is possible in this

[26] Cf. pp. 16–18, *infra*.

[27] W. T. Layton, discussion in the *Journal of the Royal Statistical Society*, XC, Part II, 259–61.

[28] L. & C. Econ. Service, *Monthly Bulletin No. 6* (1927), p. 203.

[29] If Mr. Layton meant that the 1925 production of industry and agriculture equaled that of 1907, Rowe's correction suffices, since 105 per cent of this result for 1925 (97.5) equals 101.6. But at the other extreme, if Mr. Layton meant that 1925 *industrial* production (excluding agriculture) equaled 1913 *industrial* production, then even this maximum estimate by Mr. Rowe leaves him 10 per cent behind Layton's estimate. Thus, using Rowe's data, we get:

$$\frac{\text{1925 industrial production} \cdot 1.05}{\text{1913 industrial production}} = \frac{94.8 \cdot 1.05}{110.7} = 89.8.$$

[30]

$$\frac{\text{1924 industrial production} \cdot 1.05}{\text{1907 industrial production}} = 98.1 \cdot 1.05 = 102.9.$$

way to get a result as high as 115 for 1924.[31] Mr. Layton was a proponent of the most sanguine view of British industrial conditions, and yet our estimate shows nearly double the increase of production since 1907 which even his highest guess would warrant. Put another way, our index shows from 7.5 per cent[32] to 20 per cent[33] more production in 1924 than the best estimates previous to the publication of the census results.

Everything discussed so far pertains to aggregate production. Production *per worker* will, of course, show less increase, since the numbers engaged in industry have increased since 1907. None of these previous indices were constructed to show production per worker, but the census of production also provides data to make this possible. The returns have the advantage of applying to the identical establishments to which our index of production applies.

By using these data, the Balfour Committee on Industry and Trade has arrived at an index of production per worker for 1924 of 107 (1907=100). Their method was to divide the aggregate sale value per worker, as shown by the census, by an index of general prices. The difficulty, as has been suggested, is that the data on prices do not apply—as they should—to the identical commodities whose production is indexed. Also, it is impossible to show detailed results for separate industrial groups without a separate

[31] Assume that Layton meant that 1925 industrial production equaled that of 1913. According to Rowe's data, the following two equations may be set up:

$$\frac{\text{1924 production}}{\text{1925 production}} = \frac{98.1}{94.5}$$

$$\text{and 1913 production} = \text{1907 production} \cdot 1.104.$$

Then since 1907 production = 100 for this purpose, according to Layton, we can substitute 1.104 in place of 1925 production:

$$\frac{\text{1924 production}}{1.104} = \frac{98.1}{94.5}.$$

Solving, 1924 production = 114.8.

[32] $$\frac{\text{Our estimate} - \text{Layton's highest estimate}}{\text{Layton's highest estimate}} = \frac{123.5 - 114.5}{114.5} = 7.5.$$

[33] $$\frac{\text{Our estimate} - \text{Rowe's corrected estimate}}{\text{Rowe's corrected estimate}} = \frac{123.5 - 103}{103} = 20.$$

price index for each group.[34] Nevertheless, it is important that their index is algebraically the exact equivalent of ours—provided only that the same type of formula is used for prices that we have used for quantities of production.[35]

Our production index may be compared with the Balfour result by simply constructing a separate index of the numbers employed. The accompanying table shows the result as revealed by the 1907 and 1924 censuses of production. Dividing our index of

TABLE I

PERSONS ENGAGED IN BRITISH INDUSTRIAL ESTABLISHMENTS,* 1907 AND 1924

	THOUSANDS EMPLOYED		
	1907	1924	1924 INDEX (1907 = 100)
Wage-earners	4,588	5,255	114.3
Salaried and managerial staff	335	567	169.0
All persons employed	4,923	5,822	118.3

* For the identical establishments measured by our index of production. Includes all establishments covered by the census of production, 1907 and 1924, except for railway construction. The 1924 figure is relatively too low, because of the omission of Southern Ireland in that year. The returns, however, for volume of production have exactly the same change of scope, so this does not invalidate the per worker comparison.

aggregate production by 118, the index of employment, our production relative per worker becomes 104, compared with the Balfour result of 107. Or, multiplying the Balfour per worker index by the index of employment gives a figure of 127 by the Balfour method as compared with our 123.

As we were careful to understate rather than overstate our index, the correspondence between these two independent methods of dealing with the same concept seems quite remarkable. Granted that much of this is fortuitous, the two indices do lend strong support to each other, and we must agree with the Balfour

[34] A price average for a composite whole is not likely to be valid for each of the separate parts which make it up.

[35]

$$\frac{\Sigma v_1}{\Sigma v_0} \div \sqrt{\frac{\Sigma\left(\frac{p_1}{p_0}\right)v_0}{\Sigma v_0} \cdot \frac{\Sigma v_1}{\Sigma\left(\frac{p_0}{p_1}\right)v_1}} = \sqrt{\frac{\Sigma\left(\frac{q_1}{q_0}\right)v_0}{\Sigma v_0} \cdot \frac{\Sigma v_1}{\Sigma\left(\frac{q_0}{q_1}\right)v_1}}.$$

For general proof, see Fisher, *op. cit.*, pp. 396–97.

result rather than the previous estimate—even admitting that the Balfour method used alone would be far from convincing.

The various estimates discussed may now be tabulated for comparison. In the table here presented, we have also calculated the relative production per wage-earner and per salaried employee according to the indices of the numbers engaged of these separate classes. The much more rapid increase of the clerical and managerial class makes the latter index much lower and the former somewhat higher than the general average per person employed. A 4 or 5 per cent increase in production per worker (from 8 per cent to 10 per cent per wage-earner) will, of course, seem small to anyone familiar with American experience.[86] But

TABLE II

ESTIMATES OF BRITISH INDUSTRIAL PRODUCTION IN 1924 (1907 = 100)

	Aggregate	Per Person Employed	Per Wage Earner	Per Salaried Employee
I. Rowe (adaptation of published form)	98	83	86	58
II. Rowe's best estimate (I×1.05)	103	87	90	61
III. Layton estimate (highest inference)	115	97	100	68
IV. Balfour Committee	127	107	111	75
V. Our index	123	104	108	73

it is at least a real increase, whereas any of the estimates previous to the census would show a considerable decrease, as this table suggests.

IV. THE PROBLEM OF INTERPOLATION FOR THE INTERVENING YEARS BETWEEN 1907 AND 1924

The census of production tells us nothing directly, except about 1907 and 1924. What is the best guess as to the intervening years? In order to answer that question, we present with

[86] Cf. Edmund Day and Woodlief Thomas, *The Growth of Manufactures, 1899–1923*, U.S. Census Monograph VIII (1928). By dividing their index of production for the United States by their index of wage-earners (p. 36) for the period 1904–23 an increase of 32 per cent per wage-earner is obtained as compared with our 8 per cent. This period is two years longer than ours and antedates ours slightly. An almost identical result is obtained by dividing the index of production for 1925 relative to 1909 (not published as yet, except as a mimeographed release of the Department of Commerce, May 11, 1927) by an index of wage-earners for the same period. The latter period is a year shorter than ours and covers a slightly longer period of years.

some hesitation the results which are obtained by combining our result for the end-year of 1924 with the assumption that Rowe's index is the best measure of the year-to-year fluctuations in production during the intervening years.

First, it is necessary to restrict Rowe's index to industry alone, put it on a 1907 base, and add 5 per cent to the resulting figure for the post-war years.[37] When this is done, we notice that Rowe's index is still 20 points lower than ours in the final year of 1924. This is equivalent to 19.4 per cent to be added to Rowe's index to make it correspond to ours.[38]

Now let us suppose that Rowe's index got into error gradually and continuously throughout the period of seventeen years—due, say, to factors which he was progressively less able to measure. His index should then be raised by one-seventeenth of the foregoing percentage for the first year after the base year and by equal, progressive increments thereafter up to the full amount in the seventeenth year. The results of this interpolating process are shown in Table III.

If such a procedure is to be trusted—who does not wish a better one were possible!—the following revised conclusions about British production seem warranted:

1. In 1913, the most productive pre-war year, nearly one-fifth more was turned out than in 1907.

2. In 1920, at the height of the post-war prosperity, production was but slightly greater than in 1913.[39]

[37] Rowe's own statement appended to a summary of all his annual results down to 1926 was: "In making comparisons with pre-war product, the Final Index may register as much as 5 per cent too low" (L. & C. Econ. Service, *Monthly Bulletin*, V, 203). The "final index" referred to was inclusive of agricultural production.

[38] $$\frac{\text{Our index for 1924} - \text{Rowe corrected index}}{\text{Rowe corrected index for 1924}} = \frac{123-103}{103} = 19.42.$$

[39] These two conclusions contrast strikingly with the United States, where production advanced comparatively slowly just before the war, but leaped ahead by fully 20 per cent by the close of the post-war boom. The Day-Thomas index, previously referred to, gives the following results for aggregate production (1919=100) (cf. note 36, *supra*):

1904	57
1909	74
1914	79
1919	100 (Day-Thomas, *op. cit.*, p. 192)

3. The year 1921 was apparently the only year since the war when production fell below that of 1907. But in that year it fell decidedly below—probably 15 per cent below 1907 and 30 per cent below the previous year.

4. By 1923, aggregate production seems nearly to have attained the 1913 level and was higher than in any pre-war year except 1913.

TABLE III

BRITISH ANNUAL PRODUCTION RELATIVES (INDUSTRY ONLY), 1907–1913; 1913–1924 (1907 = 100)

(Estimated by correction of the Rowe index with our census results)

Date	(1) Rowe* Published Index (1907–1913 = 100)	(2) Rowe's† Own Correction Factor Applied	(3) No. of Years After 1907	(4) Per Cent Deficiency‡ as Indicated by Our 1924 Census Result	(5) Point§ Deficiency	(6) Final‖ Interpolated Index
1907	100.1	100.0	.....	.....	.....	100
1908	93.2	90.6	1	1.14	1.0	92
1909	96.8	94.8	2	2.28	2.1	97
1910	97.1	95.7	3	3.43	3.3	99
1911	101.4	102.3	4	4.57	4.7	107
1912	103.5	104.3	5	5.71	6.0	110
1913	107.5	110.4	6	6.85	7.6	118
1920	99.9	104.6	13	14.85	15.3	120
1921	70.0	72.3	14	15.99	11.6	84
1922	87.1	91.1	15	17.13	15.6	107
1923	92.8	97.1	16	18.27	17.7	115
1924	98.4	103.0	17	19.42	20.0	123

* L. & C. Econ. Service, *op. cit.*, note 28, *supra*. Includes agricultural production.

† 1907 = 100. For industry only. Results in 1920–24 multiplied by 1.05.

‡ The 1924 percentage deficiency multiplied by the number of seventeenths indicated in col. 3

§ Col. 2 multiplied by col. 4.

‖ Col. 2 plus col. 5.

5. The 1924 production was about one-fourth higher than 1907, was comfortably better than 1913, and exceeded any other pre-war year by at least 10 per cent. This last shows the definitive contrast of our results with those of Mr. Rowe which have been commonly accepted.[40]

[40] It is impossible to know whether production *per worker* in 1924 exceeded that in 1913 or 1920 without a census or a registration of the unemployed. The latter became universal only after 1921. If workers in industry had increased at an even rate, 1924 production per worker would be more likely to have exceeded that of 1920 than that of 1913. But this is a thin conjecture.

V. METHODS OF HANDLING THE DATA

The problem of securing an index of production is hardly solved merely by getting a result. Rather, it is necessary to know with some precision what the result means. We have examined the meaning of our formula. Besides this, it is necessary to determine how the result was secured from the data available. In doing so, we shall understand better why our general result contrasts with previous indices.

The question of which industries were to be included in our index was substantially settled for us by the scope of the census of production.[41] This limits us to the fabrication of material goods, including capital equipment, and excludes personal and professional services as well as the enhanced utilities from the direct services of traders subsequent to manufacture. It is important, however, that the census does include the public utilities. The great increase in this branch was not measured by the Rowe index. The only important census group we omitted was that of railways—principally because the measure of production available was unsatisfactory, but also because the industry furnishes a direct service which is outside the scope of this index.

In general we applied our formula not only to every industry but to *every commodity* for which the two censuses provided a satisfactory quantity comparison.[42] This goes far to explain why an index based on the census gives a higher result than the pre-

[41] In *geographical* scope, the comparability of the census returns seems at first to be violated, since both Great Britain and Ireland were included in 1907 while Southern Ireland was omitted in 1924. The difficulty is more apparent than real, however. Southern Ireland has comparatively little industry, and the 1924 census reports provide a comparison excluding Ireland altogether wherever the discrepancy would be important. Such exclusions of product as there are in 1924 of commodities included in 1907 tend, of course, to lower the value of our index (cf. pp. 8, 12, *supra*). Notice that subsequent census reports on Northern Ireland merely tabulate separately the results already included here.

[42] The 1924 reports contain many more returns by quantity than those for 1907, but they are useless for our comparison unless a 1907 base can be supplied. We are hampered also by some unfortunate changes in the unit of quantity reported. The change itself may be for the better, as when woolen piece goods were reported by square yards instead of linear yards (*1924 Reports of the Census of Production, No. 29*, pp. iv–vi, *op. cit.*, note 5). But the value of censuses is largely destroyed if enumerators fail to ask the same question for at least two periods before they discontinue it.

vious indices of Rowe and others which were calculated from a sample of a few basic commodities. The divergence arises from what we shall call the "fabrication problem."

It is common knowledge that English industry has been progressing toward ever increasing fabrication, i.e., the securing of a more valuable product with a less than proportionate increase of raw material, by the expenditure of more and more labor (direct and roundabout) and better technique. Much of their increased production has taken the form of finer goods rather than a greater quantity of goods.

The first corollary of this development is that the more highly fabricated types of goods have increased more rapidly than the simple "staples."[43] It is just this increase of production which was missed by the previous indices based on a few samples.[44] Since the finer commodities are less standardized and merge into a class of entirely new commodities for which no quantitative comparison is possible, these increases in fabrication can never be entirely measured. Nevertheless, we have avoided to a considerable extent this error of overlooking the "fabrication factor" by refusing to be content with the easier samples and including every possible quantity comparison.[45]

[43] Cf. W. T. Layton, *Journal of the Royal Statistical Society*, XC, Part II, 261.

[44] Thus tons of pig iron might be considered the sample for all the ferrous metal and engineering products; or the commonest grade of cotton cloth might be the only representative of the cotton trade—or even of all textile and clothing trades. In some places, Rowe's index uses more detail than this, but elsewhere even a raw material is made to suffice to measure the product made from it (cf. pp. 9–10, *supra*).

[45] A more accurate estimate for the whole might be obtained by omitting as large a value of unfabricated goods from the index as was omitted perforce of the fabricated. This, however, would necessitate a great deal of arbitrary judgment both in classifying goods according to their degree of fabrication and in selecting the particular kinds of data to omit from the mass available. As it is, our sampling method protects us effectually from any desire to make the final result conform to any preconceived idea.

Sale value data for an industry include, of course, all its products, and for this reason the Balfour method of deflating sale value by a price index (pp. 5, 11–13, *supra*) might seem to be a solution for this "fabrication problem." But is the price index accurately representative of all the commodities measured—fine as well as staple? There is exactly the same problem in constructing the price in-

Sampling many commodities within an industry introduces, however, a problem of weighting. We have settled that weighting should be according to the value of commodities. Ideally, this should be a figure expressing value added by manufacture, for it is this value which determines the importance of any one commodity in the production of any one year. The British census has no such figure, but it does report the "net output"—sale value minus cost of all materials—and this is a reasonable approximation. Net outputs were, therefore, selected for our weights as between industries. But as between different commodities in the same industry, no such figure is available[46] and sale value itself had to be used.

It is a second corollary of increasing fabrication that the proportion of raw-material value should decrease relative to the value of work done on the goods.[47] Sale value includes the value of raw material. Therefore, the comparatively unfabricated goods in which a large proportion of the value is due to raw material will be overweighted and the higher fabricated goods will be underweighted. And since the fabricated types have increased faster than the rest, such a process will tend to lower the value of our final index. We see no solution for this difficulty except to limit the extent of the error by using net output weights between all industries which are separately reported. This furnishes an additional reason why even our index probably underestimates 1924 production.

Besides this general explanation of method, some explana-

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dex, since you must define the unit priced before you can construct a price relative that has meaning. When this has not been done, but instead the price index is based on a mere sample of a few commodities, the measure of fabrication afforded may be wholly illusory.

[46] This is partly for lack of detailed returns of costs which would be very expensive to collect and partly because of the sheer impossibility of getting anything but an arbitrary figure for separate commodities wherever these are affected by joint costs.

[47] This indicates another reason why previous indices have been too low. So far as they have relied on data as to raw material consumed, they have obviously overlooked the additional utility bestowed on a given unit of raw material by increasing fabrication. Cf. Rowe's use of import returns on cotton ("Special Memo. No. 8," *op. cit.*).

tion is necessary for the special procedures used in cases in which the census did not provide satisfactory data for our formula.[48]

1. We resorted to the Balfour method of deflating the sale value relative by a price index, in those cases in which we were able to devise a fairly accurate price index applying specifically to the industry in question and in which no direct quantity index was possible. This method was employed for a few of the non-ferrous metals,[49] rubber[50] and timber,[51] and in a modified form to be explained presently, for the engineering trades. For the reasons given, the use of this method lowers the standard of accuracy, but probably not more than would be done by the omission altogether from the index of these classes of product.

2. In the case of silk, some method had to be devised to measure the virtually new commodity, artificial silk, since not enough was produced in 1907 to be measured separately. We merged artificial and real silk by comparing their average sale values per pound in 1924, thus counting each pound of artificial

[48] A minor variation in method, not listed here, was used for the chemical trades. Data as to quantity produced were used, but this was secured, not from each group of firms as classified in their different industries by the census, but instead from all firms producing substantial amounts of the chemical in question, however classified. The sale value of each chemical determined what proportion of the net output weighting of each industry from which the product came should be applied to this particular product. By this method, our result becomes relatively free from arbitrary changes in the census classification of establishments.

[49] A price index was used only in the case of a small fraction of this group, the "white metals." This was the only instance in which a price estimate was made without considerable data. In this one case, the rough assumption was made that the 1924 average of prices was twice that of 1907. This assumes a greater price rise than that of the other non-ferrous metals (*Report No. 22*, pp. iii–iv) and consequently—so far as it affects the index at all—probably works to decrease it.

[50] Price index calculated from an average of the price quotations for raw (para) rubber from the *Statist*, last week of each month, in 1907 and 1924 respectively (London price). The price relative thus calculated became 20 for 1924 (1907 = 100). This was applied to the total sale value produced by the rubber industry, in effect multiplying it by five.

[51] Price index calculated from returns as to quantity and total value of timber imported (Great Britain, *Trade and Navigation Accounts* [1907 and 1924]). Comparable data were limited to the categories of soft woods, sawn, split, planed, and dressed, pit props, and staves. The index thus secured for 1924 (1907 = 100) was applied to deflate the sale value recorded for sawmill products, crates, boxes, and furniture wood. This sample, thus deflated, comprised about three-fourths of the net output of the whole timber trade.

silk as the equivalent of 0.503 pounds of real silk. By this method, the 1924 production for the silk trade as a whole proved to be nearly three times that of 1907, in spite of the fact that real silk decreased to two-fifths of its former volume.[52]

3. In the case of the printing and paper trades, measurement of production by the raw materials consumed is the most accurate method possible—much as it underestimates the actual increase of production. Even this index showed a 77 per cent increase, a considerable factor in the final result since it applies to such a large group of trades.

4. The woolen industry furnishes a case in which a fairly accurate picture of the whole can be spliced together from various types of data which would be unsatisfactory if taken individually. Some physical product comparisons are available and were used.[53] But they are insufficient because there has been a shift in emphasis between the different branches of the industry. Therefore, it is necessary to take a balanced sample, including some returns secured by deflation of sale value.[54] In this case, unfinished as well as completed goods had to be indexed—in spite of some duplication by this method—because varying quantities of these tops, etc., pass into and out of the hands of the trade in a semimanufactured state.

5. The most difficult and crucial problem is that of finding an index for the engineering trades.[55] These trades alone produce more than one-sixth of the British annual product,[56] and hold a particularly decisive position in relation to Britain's prosperity, so that their omission would be a serious source of possible error in any production index. The products are so unstandardized, however, that no one has ever devised a good index for them, and

[52] *Census Report No. 11*, p. ii. Cf. p. 17, *supra*, on new commodities.

[53] For tops, worsted yarn, and blankets.

[54] Used in the case of all finished tissues except blankets, including those made on commission (weighted by estimated sale value) as well as those made for sale. This price deflation was necessary because the returns as to quantity—though published—are not in comparable units in the two years (cf. note 42, *supra*).

[55] Substantially equivalent to the metal and machinery trades in the United States.

[56] Measured by net outputs shown by the 1924 census (cf. Table IV, *infra*).

Rowe's results for this division were the most open to criticism of all.[57]

Our method was to construct one general index for all these trades together, by deflating their total sale value by means of an estimated change of price. Instead of approaching this price index directly, however, we obtained the result by assuming that the average change in price for all engineering products taken together had been proportionate to that of all metals taken together. Since a fairly accurate index of production is possible for the metals, the final index of production for engineering (133) could be found by a single equation, making the discount of engineering sale value proportionate to that known to exist in the metal-producing trades.[58] Our assumption of parallel price changes for engineering and metals has good justification, since engineering products use these metals as their principal material, and employ a somewhat similar class of labor. At the same time our assumption does not shut out the chance of measuring fabrication progress as does the Rowe assumption that production itself merely kept pace with the iron and steel consumed as a raw material.

These special methods make it possible to maintain the general approach to our problem which we outline, in spite of very scrappy census data for purposes of comparison. Wherever the data allowed an ideal comparison, we made it, and we combined with this the best results possible for those other products which were vital to a good general estimate—even when the data were not ideal. We were thus able to sample almost 80 per cent of the total produced value which the census reported and to keep this

[57] His index was based merely on pig iron consumed in the country (note 47, *supra*). Cf. Rowe, "Special Memorandum No. 8," *op. cit.*, p. 6, and Layton, *op. cit.*, p. 261.

[58] Engineering production relative : engineering sale value relative = all metals production relative : all metals sale value relative.

$$x : 219.6 = 115.2 : 178.26$$

$$x = 133.1 .$$

We tested and corroborated this result in a general way by two alternative methods, which compared persons employed and power used with that in similar trades in the United States.

percentage high in nearly all the principal industries. The extent of our sample as measured by 1924 values of net output is presented in Table IV. The percentages of 1907 net outputs are almost identical throughout.

TABLE IV

NET OUTPUTS OF INDUSTRIES SAMPLED COMPARED TO TOTALS REPORTED BY 1924 CENSUS

Industrial Groups	Commodities Sampled (in millions of £)	Total Reported by Census (in millions of £)	Percentage of Sample to Whole
Mining	237.5	237.5	100.0
Iron, steel, engineering, and ship-building	254.7	289.8	87.9
Non-ferrous metals	11.4	25.1	45.4
Textiles and clothing	247.5	306.5	80.7
Food, drink, and tobacco	262.0	274.8	96.3
Chemicals	82.3	98.8	83.3
Paper and printing	81.8	97.5	83.9
Leather and canvas	11.4	14.6	78.1
Rubber	11.5	11.5	100.0
Timber trades	31.2	40.7	76.7
Building and contracting	26.9	154.3	17.4
Public utilities	59.5	99.3	59.9
Miscellaneous	4.4	18.7	23.9
All industries	1,322.1	1,669.1	79.2

VI. DETAILED RESULTS

Table V presents our general and our detailed results in comparison to those of Mr. Rowe, with the industries grouped in the manner of the British census of production. Several important observations are thereby made possible. First, we are able to see the importance of the dual system of weighting on the general result. While our final result was 123.5, the same data by the use of 1907 weights alone[59] yield 131, and by the use of 1924 weights alone[60] yield only 116.5. The mere change of weights—and consequent inversion of the same formula—makes a difference of

[59] The first term of our formula, consisting of an arithmetic mean:

$$\frac{\Sigma\left(\frac{q_1}{q_0}\right)v_0}{\Sigma v_0}.$$

[60] The second term of our formula, consisting of a harmonic mean:

$$\frac{\Sigma v_1}{\Sigma\left(\frac{q_0}{q_1}\right)v_1}.$$

one-eighth in the result! This indicates that our discussion of method was not an idle one. Measurement of production is not merely a problem in the counting of physical units of output. The relative values of goods are of the essence of the problem, and these did in fact change so radically that the particular standard

TABLE V

THE 1924 PRODUCTION OF BRITISH INDUSTRIES (BY GROUPS, 1907 = 100)

GROUP	OUR INDEX (Combined Weights)	USING 1907 WEIGHTS		USING 1924 WEIGHTS CENSUS DATA	OUR RESULTS COMPARED TO ROWE'S
		Rowe Data	Census Data		
All Trades	123.5	97.4	130.9	116.5	+ 26.1
Mining	100.1	98.2	100.8	99.4	+ 1.9
Iron, steel, engineering, and ship-building	148 0	92.7	155.3	141.0	+ 55.3
Non-ferrous metals	132.4	90.3	130.5	134.4	+ 42.1
Textile trades	101.4	71.6	100.3	102.3	+ 31.7
Food, drink, and tobacco	97.6	110.0	104.2	91.4	− 13.4
Chemicals	158.9	138.3	167.9	150.5	+ 20.6
Paper and printing	171.5	162.8	172.0	171.0	+ 8.7
Leather and canvas	136.6	131.1	151.5	123.2	+ 5.5
Rubber*	1046.5	158.3	....†....	....†....	+888.2
Timber trades	115.4	99.7	....†....	....†....	+ 15.7
Clay products, building, and contracting	118.6	110.6	121.0	116.2	+ 8.0
Public utilities	194.2	....‡....	207.9	181.3	....‡....
Miscellaneous	170.4	....‡....	170.2	170.7	....‡....

* Rubber, which experienced such a big increase in physical production, was given a weight of .85 per cent on the basis of the commodities sampled. On the basis of the total output, the weight would have been .65 per cent. The use of this latter weight would have lowered the general index of production by approximately 2 per cent.

† No difference as between weighting systems, since there was only one production relative to be weighted by net product.

‡ Rowe published no estimate.

selected makes a vital difference in one's conclusions about production. The Fisher formula which we use, while not by any means the best for all possible purposes of comparison,[61] does give a result which lies midway between the extreme that either system of weighting alone would produce.[62] Even those who can-

[61] Fisher would presumably deny even this qualification, since he places emphasis on the "ideal" nature of his formula and ranks all others according to their approximation to his (e.g., *op. cit.*, pp. xi, 529–30). He would allow other formulas on the practical grounds of fitting limited data, being easier to calculate, etc., but not as being more satisfactory theoretically (cf. note 11, *supra*).

[62] It lies midway along the geometric scale—not arithmetically equidistant. By using the geometric scale, we get the "reversability" before mentioned (pp. 6–8, *supra*).

not agree that Fisher's formula expresses the all-sufficient truth may thus welcome a practical compromise using his form where another is not specifically required, in order to eliminate the multiplicity of possible results and thus facilitate comparisons.

VII. WHY 1924 WEIGHTS GIVE THE LOWER RESULT

But why should 1907 weights give this higher result? One might at first expect the contrary—that 1924 production would amount to more when judged by the standards (i.e., weights) of its own year. One might even jump to the conclusion that the lower result with the 1924 weights indicated an industry not responsive to changes in demand, and which therefore failed to emphasize the most valuable commodities. We shall see, however, that this does not at all follow from the data we used.

The reason why the use of the base year weights of 1907 gives a higher figure than the end year weights of 1924 is that those commodities whose production increased most during the period experienced an even more rapid decline in their relative value per unit. This caused the commodities whose quantities increased most to include in 1924 a smaller percentage of the total value added by manufacture than they had formed in 1907.

But this fact that the commodities which increased most suffered a more than corresponding fall in unit values may in turn be explained by one or both of the following factors: (*a*) that, to coin a new expression, their relative *elasticities* of *demand through time* were less than unity. This is equivalent to saying that their relative flexibilities of value through time were greater than unity. While a more detailed discussion of this concept is reserved for a future treatment, when a formula for its measurement will be offered, it should perhaps be stated that it differs from the Marshallian concept of elasticity by including not merely changes *on* the demand curve resulting from changes in the quantity of the commodity in question but also changes *of* the demand curve resulting from changes in the quantity of other commodities; (*b*) that the actual historical cost curves of these commodities had a sharper downward slope to the right than those of the commodities which did not show such an advance in physical output.

If, over a period of time, the marginal cost of the A commodities (those whose quantities increased more than the average) increased less or diminished more than those of the B commodities (those whose quantities increased less than the average), then the unit values of the former would be less and their quantities greater than would have been the case with identical cost curves. If the fall in unit values more than counterbalanced the greater increase in quantities, the results would be lower weights in the case of the A commodities for the end year than for the base, which is, of course, precisely what happened in fact.

It is, of course, impossible to tell which of these two main forces had the greater influence, but the whole subject is one that merits further inductive study.

VIII. DIFFERENCES PRODUCED IN SPECIFIC INDUSTRIAL GROUPS BY THE TWO METHODS OF WEIGHTING

The detailed results for different industries repay considerable study. Although Table V nearly explains itself, we will call attention here to a few of the more important showings:

1. In general, base year weights produce the higher result for each detailed group just as they did for the final index. The exceptions are non-ferrous metals and textiles. In both cases, the opposite result was due to one or more peculiarities in the relation between production changes and value changes as recorded. In the case of copper, this seems to have been due to a drastic decrease in the cost of production; in the case of linen, jute, and hemp, demand seems to have decreased drastically. The result in both cases was a much greater decrease in the weights (based on value) than the decrease in physical production. In the case of copper and brass alloys, woolen goods, clothing, millinery, hosiery, boots and shoes, there was a much greater *increase* of weights than of production. This indicates a comparative increase of real value per unit. It might be brought about by a general shifting of demand (shift of the schedule to the right), but is most probably due to our inability to measure the full extent of the increase in production from increased fabrication. Thus the unit of product is not the same in the last year as in the first, and from being a finer product it gets a higher relative value.

2. Leather, public utilities, and chemicals showed the most marked difference in result between the two weighting systems. But in each of these cases either method would show production far above the average for all trades, so the choice of method could not possibly lower our final result. In the case of food and mining, however, base year weights give a greater production in the later year, while end year weights for the same commodities actually indicate a decreased production. For mining the two results are not far from 100. Food is a special case to be examined presently.

3. Accepting our final result from combined weights, it appears that rubber, public utilities, printing, chemicals, and engineering show exceptionally great increases. The increase in rubber production is phenomenal, but it is a small group in total, and the miscellaneous group—under which we have no sample except for musical instruments—may for the present be safely ignored. Public utilities, however, show results which no other large group in private industry can match—not even chemicals. The engineering index rests on less accurate data, but we feel confident that production is much greater than is usually supposed—even in general engineering. The motor industry—for which physical output is recorded—along with the electrical trades greatly swells the total. Iron and steel taken alone would show no increase, of course.

4. On the other side of the picture, mining, textiles, timber trades, clay, and building trades all show pathetically small increases. The situation in mining and textiles is explainable by the great reduction in export demand since the war. The clay and building index is not a good one and is influenced by the depressed pottery and glass trades. But even though the building index rests on the output of bricks alone—and therefore fails to reflect the change in building materials which has occurred—it must be admitted that the indications are disappointing for a country with so great a lack of housing.

5. Food presents a peculiar and fascinating problem. Even though it shows the only actual decrease in aggregate production, this is far from being a cause for regret. The decrease in the total is almost wholly due to the greatly decreased production of alco-

holic liquors. With base year weighting, this decrease is weighted by the tremendous total value for 1907. But instead of this being compensated by a low weight for 1924, the prohibitive taxation which largely caused the decrease acted to increase the value per unit so greatly that the comparative weight for 1924 is greater than that for 1907. Alcoholic liquors thus swing the whole food index—the more easily since so much of English food is imported and not manufactured. When one looks more in detail at the important articles of diet which are home-produced—especially dairy products—the increases are encouraging.

6. Our food, drink, and tobacco index is the only group index which is lower than Rowe's. On the average our indices are 26 points higher. It is particularly instructive to notice which groups show the greatest gains by using the new data. Rubber products; the iron and steel, engineering, and shipbuilding group; non-ferrous metals; textiles and clothing; all show greater than the average excesses of our index over Rowe's. In every case, the difference is most plausibly ascribed to Rowe's enforced neglect of fabrication increases which we have explained.[68] It is obvious that the product from a unit of raw material in these industries is far more effective in want satisfaction now than in 1907. The development of tires and the thousands of other uses for rubber, the increasing fineness and complexity of machinery, practically the whole development of motor transportation, the new fabrics, increasing fineness of the old, and the developments in clothing, hosiery, and shoes are all included in this extra production which Rowe's samples could not measure.

Rowe's sample from the chemical group was evidently better than most of his, but even it shows a deficiency of nearly as much as the average of 26 points. Our index is in excess of Rowe's by less than this average for all the other groups except public utilities and miscellaneous, for which Rowe furnished no index. The omission of public utilities, in which production nearly doubled, contributed greatly, of course, to the low numerical result of his index.

[68] Cf. pp. 9–11, *supra*.

IX. PRODUCTION COMPARED WITH NUMBERS EMPLOYED IN SPECIFIC INDUSTRIAL GROUPS

When production is reduced to a per capita basis, it will be seen that the average increase for all industry was but 4 per cent. The advance in the rubber industry was the greatest of all, amounting to 441 per cent, while the increase in paper and printing was 51 per cent, in public utilities 29 per cent, in leather 21 per cent, in iron, steel, and engineering 17 per cent, in timber 14

TABLE VI

COMPARISON OF BRITISH PRODUCTION AND WORKERS EMPLOYED—BY INDUSTRIAL GROUPS, 1924 RELATIVE TO 1907 (1907 = 100)

GROUP	AGGREGATE PRODUCTION	RELATIVE NUMBER OF		RELATIVE PRODUCTION PER	
		(a) Wage-earners	(b) Total Employed	(a) Wage-earner	(b) Employee
All Trades	123.5	114.5	118.3	107.9	104.4
Mining	110.1	139.0	139.5	72.0	71.8
Iron, steel, engineering, and shipbuilding	148.0	119.0	126.5	124.4	117.0
Non-ferrous metals	132.4	149.5	155.3	88.7	85.3
Textile trades	101.4	95.3	96.8	106.4	104.7
Food, drink, and tobacco	97.6	108.6	114.8	89.8	85.0
Chemicals	158.9	128.8	137.6	123.4	115.5
Paper and printing	171.5	108.5	113.9	158.1	150.6
Leather	136.6	110.9	113.2	123.2	120.7
Rubber	1046.5	182.4	193.4	573.7	541.1
Timber trades	115.4	96.2	101.6	119.9	113.5
Clay products, building, and contracting	118.6	110.0	113.0	107.8	105.0
Public utilities	194.2	142.9	150.5	135.9	129.0
Miscellaneous	170.4	195.0	201.0	87.4	84.8

per cent. In clay products and the textile trades, the advance amounted to 5 per cent. In the food, drink, and tobacco trades, however, the average productivity of the employees was 15 per cent less than it had been in 1907. This was also the case with non-ferrous metals and with miscellaneous industry. In mining, the per capita decrease was even greater, coming to no less than 28 per cent.

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INTER-ALLIED DEBTS, REPARATIONS, AND NATIONAL POLICY

THE tremendous financial burden of the World War presented, among other important questions, that of its distribution among the participants. Each nation involved was obliged, naturally, to assume a large part of the expense of equipping and supporting its own armed forces, but it became apparent at an early stage of the conflict that the economically stronger countries must render financial support to the weaker countries if the maximum combative effort were to be exerted. The adoption of this policy by the Allied governments, including the United States after April 6, 1917, led to a series of arrangements for co-operative financial support which did, in fact, render their military efforts more effective, but which involved some general questions of policy that cannot yet be regarded as finally settled, despite a considerable amount of discussion and negotiation. Another aspect of the same general problem of disposing of the costs of the war is encountered in the determination of the amount of reparations to be exacted from Germany, and in the establishment of a neat balance between the amount that Germany can pay and that which the creditor nations will accept. A third angle of this general problem is presented by certain matters of national policy, such as the pressure for more effective protection of home markets by means of higher tariff rates, the encouragement of American capital investments abroad, and the desire to relieve agricultural, and, if necessary, business depression, and, finally, the insistence that none of these matters has any connection with any other.

The important question for decision is whether or not the inter-Allied debts and the German reparations are entirely independent, and whether both of these issues, in addition to being independent and distinct, are so remote and disassociated from the American economic entity as to be entirely unaffected by anything that may be undertaken or desired here in the manipu-

lation of the tariff, in the investment of capital abroad, or in the relief of depressed business conditions. The official view has been, consistently, that these matters are in separate water-tight compartments, and that whatever may be done in any given compartment can have no possible effect, economic, moral, or psychological, on the situation in any other compartment. If this view should be correct, an assumption which violates all experience in international affairs, it would follow, for example, that no action could be taken in this country with regard to either the inter-Allied debts or the reparations question that could be productive of relief in the depression which agriculture has experienced for some time and which may now be threatening business in general.

The purpose of this article is to show that while the official attitude may be legally correct, it cannot be upheld on economic grounds, and to point out, further, that a different solution of the reparations–Allied debt tangle may contribute substantially to the long-run improvement of American agriculture and business. Although the facts relative to the debt settlements and the revision of reparations are matters of public record, these facts may not be generally available, and it seems advisable to supply here, as part of the argument, an outline of these developments to date.

INTER-ALLIED DEBT SETTLEMENTS

The inter-Allied debts are the debts which were incurred during and after the war by the allied European governments for the purposes, first, of obtaining funds for the purchase of supplies for military forces and the civilian population, and, second, for the financing of rehabilitation and reconstruction work after the cessation of hostilities. Great Britain had recognized and dealt with this problem before the United States entered the war by extending credits to France and Italy, thereby imposing an additional strain on her own credit and taxation resources. The successive Liberty Loan Acts authorized the allocation of a portion of the proceeds of these loans to the financial support of the Allies through the acquisition, by the federal Treasury, of the debt obligations of these governments. The authorized amount of such loans was steadily extended until it eventually reached a

maximum of $10,000,000,000. Funds at the disposal of certain war agencies were also utilized, so that the total of the advances made was somewhat in excess of this sum.[1]

According to the legislation under which these advances were authorized, they were loans from the United States to her associates in the war. Each advance was evidenced by the delivery to the Treasury of the debtor government's note in which was contained an express agreement to repay the principal and to pay meantime a definite rate of interest. The Liberty Loan Acts, in authorizing the extension of credits, required that the stipulated interest rate should be adjusted so as to equal the highest rate to be paid by the United States on its war bonds.

It seems clear that at the time the advances were made, the debtor governments regarded them as loans in the ordinary sense, which were to be subject to the customary procedure with respect to repayment of principal with interest. Various statements of high government officials in England and France confirm this view, as does the fact that the statutory terms imposed by Congress were invariably complied with by foreign governments before the loans were made. That is, notes containing an engagement to pay principal and interest were in every case given to the Treasury before the credit was opened. The suggestion was advanced at one time that the American people would gladly contribute outright a substantial sum for the aid of France, in recognition, perhaps, of French services during the Revolution, but this proposal was quickly rejected by the French premier, M. Ribot, in part at least on the ground that special favors to France would be humiliating.

The discussion in Congress at the time that the Liberty Loan Acts were being considered illustrates the well-known and often demonstrated tendency of the members of that body to talk one way and vote another. Many prominent members of both houses declared their willingness to lend whether the money was ever repaid or not, while some stressed the necessity and advantage of contributing American money in the common cause when it was

[1] In 1922 the net advances to be refunded amounted to $10,102,140,000, with unpaid interest thereon amounting to $1,554,791,000, a total of $11,656,931,000 (World War Debt Commission, *Annual Report* [1922], p. 10).

yet impossible, for lack of time, to provide men and materials.[2] Despite these expressions the laws as enacted permitted only of the construction which then prevailed everywhere in official circles, namely, that debts had been incurred which were at some time and in some way to be repaid.

At the official termination of the war the Allied debt situation was an unsatisfactory one both to debtors and to creditors. Interest was due but not paid. There had been no arrangement of either the final interest rate or of the terms of payment of the principal, and without determination of these matters the budget of every debtor country was subject to disturbance. The sinking fund legislation enacted after the war for the redemption of the federal debt contemplated repayment of the full principal of the foreign debts, for the appropriation to the sinking fund was to be based on the aggregate outstanding amount of bonds and notes as of July 1, 1920, less the par amount of such foreign obligations as of that date. On February 9, 1922, Congress created the World War Foreign Debt Commission, to consist of the secretary of the Treasury and four others to be appointed by the president with the approval of the Senate. This act imposed severe limitations on the authority of the Commission, in providing that it might not extend the maturity of any debt beyond June 15, 1947, nor establish an interest rate below 4¼ per cent. The Commission was further forbidden to exchange the bonds of one government for those of another, or to cancel any part of the principal of any debt except through repayment. Thus Congress again set its stamp of approval on the viewpoint that the Allied debts to the United States were ordinary business loans, to be met exactly as any creditor might expect his loans to be met.

The limitations on maturity and interest rate were clearly unreasonable. As a matter of fact, the Treasury was destined, within a few years, to create a substantial volume of federal debt with a maturity extending beyond 1947, and at interest rates materially below 4¼ per cent. If the wealthiest nation in the world found such arrangements advantageous, certainly it was appropriate to extend similar accommodation to its war-torn

[2] Cf. speech by A. P. Andrews in which such statements are quoted. Reprinted in Gerould and Trumbull, *Inter-Allied Debts*, pp. 304 ff.

debtors. The necessity for relaxation of these terms became apparent during the discussion of the British debt, and in February, 1923, at the time of ratifying the British agreement, the debt-funding act was amended by authorizing the Commission to make debt settlements with other governments on such terms as it might deem to be just, subject to the approval of Congress. The Congressional instructions to observe justice in the debt settlements without reducing the principal are as logical as the old jingle in which the mother authorized her daughter to go out to swim, but in no event to enter the water.

The Commission proceeded to negotiate agreements for the refunding of the debts due, and the settlements as finally determined resulted in an aggregate of $22,143,539,000, represented by $11,522,354,000 of funded principal and $10,621,165,000 of interest to be received on the unpaid instalments of this principal.[3]

The latitude allowed to the Commission under the amendment of 1923, to effect such settlements as it might deem just, was exercised thriftily. As a guiding principle the Commission took the position that no reduction should be made in the amount of principal computed to be due, a position established in the original Debt Commission Act. Concessions made in the name of justice, where extended, were to be allowed by modifying the interest rate. The arrangement concluded with England became the model for eight other agreements,[4] although some minor variations were introduced relative to the rate of payment in the earlier years. In general, these agreements provided for repayment of the principal in full, plus interest thereon at 4¼ per cent to December 15, 1932, and at 3 per cent thereafter. Complete repayment was to be accomplished in sixty-two years.

[3] World War Foreign Debt Commission, *Combined Reports*, p. 440. A joint resolution of Congress authorized postponement of negotiations for funding the loan to Austria for twenty years. At the time the Commission submitted its final report no arrangements had been made with respect to the debts of Armenia, Greece, Russia, and Liberia, the total of which was $218,985,000 of principal and $79,981,000 of interest.

[4] Finland, Hungary, Poland, Lithuania, Latvia, Esthonia, Czechoslovakia, and Rumania.

The Belgian settlement marked the first important departure from the general scheme thus far followed. Belgium's situation was peculiar. At the Peace Conference Belgium had presented claims for war damage amounting to $1,000,000,000, and claims for the cost of redeeming German paper currency issued during the occupation to Belgian citizens, amounting to $1,200,000,000. She declined to be a party to the Conference unless these costs were recognized as a prior claim on reparation payments. Under the leadership of President Wilson, however, Belgium was persuaded to reduce this claim to a total of $500,000,000, on condition that the signatory powers cancel their pre-Armistice loans to her and substitute Germany as the debtor nation.[5] Incidentally, this agreement linked debt settlements and reparations in the minds of all who had to do with the Treaty of Versailles.

The Debt Commission took the perfectly correct legal position, which was also a very convenient position for other reasons, that inasmuch as the Senate had refused to ratify the Treaty of Versailles, no stipulation contained in it had binding effect on the United States. Of the moral obligation involved in view of the circumstances, nothing was said, beyond emphasizing the Commission's magnanimity in foregoing the interest on the pre-Armistice loans, the principal of which was $171,780,000. In his reply to the opening remarks of the Belgian ambassador, Mr. Mellon said:

> . . . . You may rest assured that with the feelings America has for you and the appreciation which we have of your difficulties, your position will have the most sympathetic and friendly consideration by our Commission.
>
> The funding of your debt to us within your capacity to pay means far more than the mere payment by you and the receipt by us of a certain number of dollars each year. It is a recognition of the integrity of international obligations.[6]

The Treaty of Versailles stipulated that Germany was to reimburse Belgium for all sums borrowed from Allied governments prior to November 11, 1918, and required the delivery of 5 per cent bonds covering this total to the Reparations Commis-

[5] World War Foreign Debt Commission, *Final Report*, pp. 178–79.

[6] *Ibid.*, p. 167.

sion. These and other bonds required of Germany were scrapped by the Dawes Plan. The Paris agreement of January 14, 1925, recognized the Belgian priority to the reparation annuities, and arranged for a distribution of the amount so allotted among Belgium's creditors in satisfaction of the pre-Armistice loans. Obviously, however, the recovery which these creditors will receive, as well as the amount of her reduced reparation claim which Belgium will eventually obtain, will depend on what Germany actually pays. The Young Plan has reduced the annual obligation materially below the standard payment of the Dawes Plan, and has set a total very much less than had heretofore been thought likely. These prospects diminish materially the magnanimity of the American settlement with Belgium.

In the Italian and French negotiations, conducted during 1925, the principle of capacity to pay was given official recognition as an important consideration in working out debt settlements.[1] In both cases no formal concession was made as to the principal, but the schedules of interest rates indicate the extent to which the Commission's estimates of capacity to pay influenced the terms of the respective agreements. No interest is to be charged to either France or Italy until June 15, 1930. Thereafter France must compute interest on a scale which begins at 1 per cent and rises to 3.2 per cent during the period 1965 to 1987, while Italy will pay interest on a scale of rates beginning with one-eighth of 1 per cent and rising to 2 per cent during the years 1980–87.

It was frequently asserted, in the various reports and statements issued relative to the French and Italian settlements, that the terms agreed upon represented the maximum that either country could pay. The Italian Commission presented a carefully prepared statement of their economic and financial condition, on the strength of which they made an offer that was somewhat more than half of the Debt Commission's original proposal. That they were good traders is shown by the fact that the terms of settlement were established materially below the first American proposal. Thus, the present value at 4¼ per cent of the first Italian

[1] Moulton and Pasvolsky, *World War Debt Settlements*, p. 118.

offer was $371,000,000, as against $606,000,000 for the Debt Commission's first offer, and $538,000,000 for the final terms.[8]

The question whether the Italian and French agreements represented a scaling of the principal or not is a matter of tweedledum and tweedledee. The amount to be paid may be said to represent the original principal, plus an abnormally low interest, or it may represent a considerably reduced principal plus a normal interest charge. In much less extreme form the same issue arises in the case of the other settlements. The Commission's construction of its action was perhaps necessary in order to satisfy Congress and public opinion; but since no nation could expect to borrow substantial sums at the interest rates used in computing the total of either the French or the Italian payments, the common-sense view would be that a material reduction of the principal had, in fact, been granted.

The official American viewpoint regarding the cleavage between the debts and the German reparation payments was insisted upon in the French settlement. The first French mission, headed by M. Caillaux, had asked for a so-called "safeguard" clause, whereby France would be obligated to make payment to the United States only to the extent that Germany should actually make the scheduled reparation payments to France. The Debt Commission refused categorically to accept this proposal, and no agreement was reached with the Caillaux mission. The outcome was for the time unfavorable to France, as the agreement negotiated by Ambassador Berenger in 1926 called for heavier payments than Caillaux had proposed. The present value of the Caillaux proposal at 4¼ per cent was $1,755,000,000, while the present value of the payments under the Berenger agreement is $2,008,000,000.[9] The French debt settlement was ratified by the Chamber in July, 1929. Despite the opposition to it, this settlement was more palatable than the alternative of paying $400,000,000 in cash for war supplies.

The Debt Commission concluded its report on each agreement with an affirmation of its belief that it represented a fair

[8] World War Foreign Debt Commission, *Final Report*, pp. 224, 259.

[9] *Ibid.*, p. 255.

and equitable adjustment of the particular country's debt to the United States, thus signifying its discharge of the legal obligation laid upon it. But the lesson from the settlements is clear—the best bargains go to the best hagglers.

REPARATIONS

Long before the war ended, the political leaders on both sides were spurring their people on by their promises of huge settlements to be exacted from the opponents when victory came. There was, in this preliminary agitation, little effort at distinction between "reparation and indemnity," although the two are reasonably distinct. Reparation means a making good of the destruction and damage arising out of the war operations. Indemnity means a contribution exacted by the victor from the vanquished for the purpose of repaying or indemnifying the victor for his war costs.[10] The damage is part of the cost in a broad sense, but it is not the whole of that cost. Popular opinion in Allied countries was so inflamed at the close of the war that there was a disposition to exact the uttermost farthing of recompense that could be squeezed. In the so-called "khaki election" in England on December 14, 1918, a popular slogan was "Hang the kaiser and let the Germans pay the costs of the war." There can be little doubt that in the reverse circumstances a similar viewpoint would have prevailed in the central powers. In fact, the large indemnity levied upon France in 1871 stood as an impressive precedent for what the Germans would have done in the event of victory, and for what the Allied powers sought to do.

It is unnecessary to repeat here the details of the reparations section of the Treaty of Versailles, nor the story of how these sections were built.[11] The war passions were still at white heat while the treaty was being written and only the coolness of the Americans prevented that document from including even more greatly exaggerated claims than were actually inserted. One of

[10] Cf. the explanatory and historical account of war indemnities in *Peace Handbook No. 158*, "The Indemnities of War," issued by the British Foreign Office, 1920.

[11] B. M. Baruch, *The Making of the Reparations and Economic Sections of the Treaty* (New York, 1920).

the most severely contested items that finally went in was the claim for pensions. The Americans, knowing what they did of the way in which pension costs may be magnified and prolonged from their own country's experience, may well have hesitated to allow them. For political reasons England was obliged to demand the inclusion of pensions, since the English share of reparations, based on civilian war damage alone, would have been relatively small. Mr. Baruch shows that France, torn between imposing the heaviest possible burden on her traditional enemy and obtaining the best terms for herself, chose the former. Had pensions been excluded, France would have been entitled to a much larger percentage of total payments, and she might possibly have obtained a larger absolute total, even though the reparations bill were smaller, than will be hers under the eventual arrangement. Fortunately, reason prevailed over passion, at least to the extent of realizing that Germany could not possibly pay all that the Allies would like to demand. A total sum for reparations was not stated in the treaty, but Germany was required to begin at once substantial deliveries which were to be credited against this total when determined. The whole scheme of exacting compensation from Germany for war damage and war costs was destined from the nature of things to be a source of difficulty and friction, for various reasons.

In the first place, the Allies, and particularly France, were insistent that large contributions for reconstruction in the occupied regions be forthcoming at once. Germany was required to issue bonds to the amount of 20,000 million gold marks, due May 1, 1921. Payments and deliveries were to be credited against these bonds, thus redeeming them, but any unredeemed portion was to be refunded into other bonds. The emphasis was on the contributions for restoration, and the bonds were thought of chiefly as a guaranty of performance. The fact was overlooked, or disregarded, that a large, steady stream of contributions could not be immediately initiated by a nation that had gone through four years of war, without some opportunity of economic recuperation.

In the second place, there was great disorder of procedure on

both sides. Deliveries in kind and in cash were made and accepted in considerable quantity before any adequate system of accounts and of controlling records had been established. The natural consequence was prolonged and bitter disputes as to the degree to which the preliminary engagements had been met, with no adequate means of proving the case on either side. Moulton and McGuire state that Germany claimed credit for deliveries and payments valued at some 45,000 million gold marks, while the Allied governments had credited about 8,000 million gold marks against the amount due under the treaty. Differences in valuation account for a part of this discrepancy, but after all due allowance, these authors confess their inability to explain a difference of some 17,000 million gold marks in the figures advanced.[12] As a result of this and of other sources of discord, the story of the first two years of reparations is a tale of bitterness and recrimination, of grandstand plays by the politicians, and of mounting national jealousies and hatred, which led one European observer to remark that the horrors of peace were worse than the horrors of war. The Allies occupied German territory and established a customs barrier around the Rhineland for the collection of taxes on goods passing from Germany to the Allied countries.

Finally, the whole reparations question was veiled, from the beginning, in the dense obscurity of uncertainty. The Allies were not ready with an estimate when the treaty was signed, and that instrument provided that a Reparations Commission be created, with power to establish the total, such determination to be made by May 1, 1921.

After much delay, and after experiencing great difficulties in obtaining from the Allied powers definite statements of the amount of war damage claimed, the Reparations Commission announced, late in April, 1921, its decision that the total of the damage and reparation claims for which Germany should be held was to be 132,000 million gold marks. This amount was far below some of the figures suggested, and it was set forth without any consideration of whether or not such a sum could be paid.

[12] Moulton and McGuire, *Germany's Capacity To Pay*, p. 74.

Nor was any suggestion offered as to the duration of the period of payment. It was simply a total. There were added 4,000 million gold marks for the Belgian debt which was to be assumed by Germany in accordance with the treaty.

The Supreme Council, established by the treaty, met in London on May 5, 1921, and gave Germany six days in which to accept the terms of the Reparations Commission. This Council added various conditions, among them the following: (1) Germany was to issue bonds in the amount of the total due, in three series—A, 12,000 millions; B, 38,000 millions; and C, 82,000 millions. (2) Until the bonds were redeemed, Germany was to pay annually 2,000 million gold marks, plus a levy of 26 per cent of the value of her exports. (3) Failure to accept these terms or to comply with them would lead to occupancy of German territory. The demand for bonds representing reparation obligations was a favorite device of the Old-World statesmen who were dealing with this problem. The ultimatum was accepted and Germany set up a treaty obligation budget in her effort to comply with these terms. Revenues adequate to this burden were not forthcoming, however, and resort was had to paper money. France occupied the Ruhr on January 11, 1923, after the Reparations Commission had declared a default on timber deliveries, but this move proved abortive, as the Germans suspended reparation payments and direct requisitions by the occupying power yielded comparatively small returns. The mark continued to depreciate and by the end of 1923 had become practically worthless.

It is a curious fact, and one not wholly complimentary to the persons concerned, that with all this bluster and sword-rattling, there was no recognition, among responsible officials, of the conditions which must be observed if Germany were to pay reparations. At any rate, if these conditions were perceived, they were kept well in the background while the ultimatums were being written and the expeditions were being dispatched to occupy German territory.

THE DAWES PLAN

It was probably true that in the state of nerves which prevailed in all of the belligerent countries, a cooler and more dispas-

sionate view of the facts was hardly possible until after the lapse of a certain time. The suggestion of an impartial survey by experts was made by Mr. Hughes in December, 1922, but almost a year passed before any European country took cognizance of it. The idea led, however, to the commission of experts, commonly referred to as the "Dawes Commission," from which came the first statement of the factors involved in the reparations problem, and the first reasonable approach to the question of the annual payments to be asked of Germany.

The main thread, for the purposes of this discussion, is the reparations question, and this alone will be followed, although it is realized that other phases of the experts' plan, such as currency stabilization and bank reorganization, were necessary supporting features of the reparations scheme.[12]

With direct reference to the reparations payments, the first important problem with which the experts had to deal was that of establishing a permanently balanced budget, as the report said:

> It is not enough to be satisfied that one or even several budgets will be balanced. It is necessary to consider under what conditions, assuming sound administration, financial as well as currency stability can be continuously insured, or rather under what conditions such stability once gained is likely to be endangered.[12a]

It was realized that the maintenance of a balanced budget would be much more difficult if the full weight of reparations payments were to be carried by the budget from the first. The experts felt that Germany should pay reparations to the extent of her ability, and to this end they held that the German people should bear a weight of taxation commensurate with that of the taxpayers in Allied countries. But the sole object of their undertaking was not simply that of getting reparations payments out of Germany. The reconstruction of Germany was regarded as only a part of the larger problem of the reconstruction of Europe.

There were certain outstanding principles in the plan which

[12] The stabilization measures are described by the agent general for reparations in his *Report* for the annuity year 1924–25.

[12a] *Reports of the Expert Committees Appointed by the Reparation Commission*, p. 18 (Cmd. 2105, London, 1924).

the experts proposed. The first was that, whatever the basis of reparations payment, the method of determining increases in that payment should be determined in advance, in order that neither the finances nor the foreign relations of Germany be endangered by renewed disputes. Accordingly, the Plan provided for a definite annuity payment for each of the ensuing five years, the amount of which was to rise from 1,000 million gold marks in the first year to 2,500 million gold marks in the fifth, or standard year. Thereafter, this standard payment was to be subject to revision according to an index of German prosperity, and also according to changes in the purchasing power of gold.[14]

The payment at the Reichsbank of the amounts specified under the Plan, for the account of reparations, was to be regarded as the definitive act of meeting the obligation. Whether the funds paid in were transferred to the claimant countries or not, Germany was not to be regarded as being in default as long as the scheduled payments were made in marks at the Reichsbank. The transfer of the funds under the control of the Transfer Committee was a separate matter which will be dealt with later. The experts assumed that Germany would be given full economic rights over her territory, and advanced as an essential part of the Plan a system of control which they believed would be more effective in promoting compliance with its terms than military occupation could be. The simple and direct language of the report on the subject of the impaired financial and economic unity resulting from the military occupation leaves no doubt as to the opinion of the experts regarding this method of procedure.[15]

A second principle of the Plan was its designation of the sources from which the payments to be made on reparation account were to be drawn. In order to make the scheme workable, it was necessary to indicate the way by which the funds could be provided. The sources of the money and the relative proportion drawn from each source for each of the transition years are shown in the attached diagram (Fig. 1).[16]

[14] Either party might ask for a revision of the annuity whenever it was believed that the purchasing power of gold had changed by 10 per cent.

[15] *Reports of the Expert Committees Appointed by the Reparation Commission*, p. 13 (Cmd. 2105, London, 1924).

[16] This diagram is taken from the *Interim Report of the Agent General for Reparation Payments*, June 7, 1928, p. 4.

Under normal circumstances it was recommended that Germany provide reparation payments from the following sources: the ordinary budget, the railway bonds and transport tax, and the industrial debentures. In the first year, however, it was felt that the balancing of the ordinary budget would be a sufficient task, without imposing any material part of the burden of reparation payments on the German economy. Accordingly, an external loan was arranged for, to support the new bank issue, to finance deliveries in kind, and especially to create confidence in the whole plan.

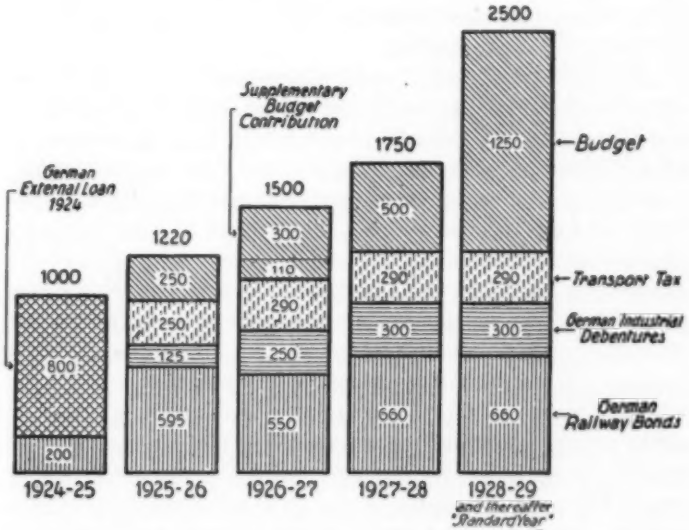

FIG. 1.—Composition of the annuities (in millions of gold marks)

The other specific sources of revenue which the experts proposed require brief explanation. It was found that the German railway system had been rather thoroughly relieved of debt by the fall of the mark. The Commission's railway experts decided that the system was capable of earning a fair return on the investment, and in order to devote some part of these earnings expressly to reparation payments, the railways were transferred to a railway company which, in turn, issued bonds to the amount of

11,000 million gold marks, on which it was to pay the interest and amortization charges. These bonds were delivered to a trustee appointed by the Reparations Commission, and were secured by a first mortgage on the railway property, as well as by a guaranty of the German government.[17]

The railway company was also to pay the transport tax at the rate of 7 per cent on the gross receipts of all freight traffic other than coal, and at rates varying from 10 per cent to 16 per cent, according to class, on the gross receipts of all passenger traffic. The payments from this tax on reparations account were to be in the amounts shown in this diagram, and were to endure for the whole period of the railway concession, forty years, even if the bonds had meantime been redeemed.

The industrial debentures were issued on the security of German industrial, mining, and shipping concerns, many of which had likewise become virtually free of debt during the inflation period. The total of such bonds was to be 5,000 million gold marks, bearing 5 per cent interest and 1 per cent charge for sinking fund. No interest was to be paid on these bonds in the first annuity year, the full interest charge was to be borne in the third year, and the sinking-fund payment was first instituted in the fourth annuity year. This arrangement, which was similar to that provided for the railway bonds, was in recognition of the depletion of liquid capital, and the need of an opportunity for recovery before the full burden was assumed. The bonds were the direct obligations of the several individual business concerns. These were delivered to a trustee appointed by the Reparations Commission and were secured by a first mortgage on the plant and property of the respective concerns. The German government was required to add its own guaranty of interest and principal.

It was recognized that Germany's creditors would desire tangible and productive guaranties, over and above the bonds which have been described in the foregoing. The experts rejected all schemes of complete control over German revenues and expenditures, but suggested a compromise whereby the collection

[17] The diagram shows the amount contributed toward reparations by the railway bonds, according to the experts' recommendations. The full interest rate was charged in the third year, and the sinking fund began in the fourth year.

and disposition of certain revenues could be assigned to Germany's creditors. These revenues were to serve as a collateral rather than as a primary security, that is, the creditors were not to take directly the yield of the controlled taxes, but since their representatives did control them, there was assurance that revenues were being collected which would enable the budget to provide for the reparation payments charged to it. In the first standard year (1928–29), this was to be 1,250 million gold marks. The experts suggested, as the field of the controlled revenues, the taxes on alcohol, tobacco, beer, sugar, and the customs. All receipts from these taxes, in excess of the amounts required for reparation payments, were to be released to the general uses of the government.

A third outstanding principle of the experts' plan was its suggestion for adjustment, already mentioned, according to variations in German prosperity and in the purchasing power of gold. The operation of the prosperity index would doubtless have been in the direction of increasing materially the annual payments.

A final principle to be mentioned was the introduction of a system of external control over revenues and payments. The operation of the whole plan was placed in charge of an agent general for reparation payments, who has reported regularly to the Reparations Commission. Under the direction of the agent general, various commissioners and trustees have been administering, or assisting in the management of, the railways, the Reichsbank, the controlled revenues, and the railway and industrial debentures. These officials and their staff employees are all of other nationalities than German.

The Plan distinguished carefully between the amount of revenue which Germany could raise for reparation account, and the amount which could be transferred to foreign countries. The vital aspect of the reparation problem is that of making the transfer. Reparation contributions must be provided by levies on the people, through taxation or otherwise; but the funds can be transferred to other countries only by means of an export surplus. In order to prevent a breakdown of the currency and budget sys-

tem through ill-advised attempts to transfer all that had been accumulated on reparation account, the Plan provided for a Transfer Committee, of which the agent general was to be the chairman. The procedure of making payments involves, first, deposit of all funds for reparation purposes in the Reichsbank to the credit of the agent general, and, second, control of withdrawals from this account by the Transfer Committee. Disbursement of the accumulated funds, whether in payment for deliveries in kind or for conversion into foreign currencies, may be suspended whenever, in the judgment of the Committee, the stability of the German currency would be endangered by further operations in the foreign exchange market. Provision was made for the investment of a limited amount of accumulated funds in German securities, in all 5,000 million gold marks, pending a recovery of the exchange market, and also for the suspension of further payments into the reparation account when, in the Committee's judgment, such continued payments, in view of the accumulations on hand, became a menace to Germany's fiscal or economic condition. In other words, Germany's contributions were to be governed, ultimately, by the possibility of transferring the funds without damaging the German economic order.

The Dawes Plan has thus far functioned smoothly. The agent general's reports present a detailed current account of the activities of the different trustees and commissioners, and, in addition, a competent analysis of German economic and financial conditions. Germany has met, thus far, punctually and faithfully, every obligation that was imposed. This Plan was introduced at a time when the Allied powers had reached a deadlock in their efforts to deal with the reparations question. Coolly, quietly, impartially, the experts analyzed the situation and proposed a temporary solution, the acceptance and application of which has contributed immensely to the reconstruction of all Europe.

But the Plan has rendered its service in thus bridging the difficult reconstruction period. It failed to deal with certain important matters which are vital to the ultimate solution of the problem.

In the first place, the Dawes Plan was deficient in that it set no limit to the amount of reparations to be paid, nor to the period during which the annuities were to extend. Nothing was said, either, of the question of interest. No modification was suggested of the total announced by the Reparations Commission in 1921, in all 136,000 million gold marks. Without a determination of whether interest was to be computed on the unpaid portion, and if so, at what rate, Germany had no means of ascertaining the duration and the ultimate extent of the burden.

In the second place, the Plan suggested no procedure for the elimination of the system of control by foreigners which it introduced. The indefinite prolongation of this situation could only be a source of irritation. In December, 1927, the agent general said, at the conclusion of his report:

> And as time goes on, and practical experience accumulates, it becomes always clearer that neither the reparation problem, nor the other problems depending upon it will be finally solved until Germany has been given a definite task to perform on her own responsibility, without foreign supervision and without transfer protection. This, I believe, is the principal lesson to be drawn from the past three years, and it should be constantly in the minds of all concerned as the execution of the Plan continues to unfold.[18]

A third defect in the Dawes Plan has been that it provided no real test of whether Germany could meet the standard payments proposed. The full weight of the standard annuity fell on the German people for the first time in the year 1928–29. The agent general stated, in his report covering the fourth year, that no question could arise, in the light of experience to date, of the ability of the budget to provide the full amount of the standard contribution.[19] He repeated, however, his earlier suggestion that steps be taken to end the uncertainty which still hung over the matter of aggregate payments.

It will be observed that the foregoing statement regarding Germany's capacity was confined to the productivity of the budget. The standard contribution can be produced from the income of the German people, this year, next year, and, it may be, indefinitely. Can it be transferred to the creditor powers? This raises

[18] *Report of the Agent General for Reparation Payments* (1926–27), p. 318.

[19] *Ibid.* (1927–28), p. 3.

the transfer question, which is, as the experts recognized in 1924, the critical part of the whole reparation program. It was the aspect which was most completely ignored during the days of bluster and sword-rattling that followed the Armistice, when the politicians were demanding that Germany pay all war costs and were sending punitive expeditions to collect the bills that were alleged to be in default.

THE YOUNG PLAN

Before considering the transfer problem, it will be advisable to outline the more important changes that have been proposed by a second commission of experts, which sat in Paris in 1929 under the chairmanship of Mr. Owen D. Young. This plan was finally agreed to and placed in effect by a conference at The Hague, whose members signed the protocol on January 20, 1930.

The Young Plan sets a limit to the German obligations by determining the number and the amount of the annual payments. The annuities rise from 1,700 million to 2,400 million gold marks during thirty-six years, then drop to 1,600–1,700 million during nineteen years, and then to 900 millions for three years at the end. Of these amounts, 660 millions are to be paid unconditionally each year, and the remainder of any instalment may be postponed, in whole or in part, for one or two years in the event of exceptional economic difficulties.

The prosperity index and the provision for revaluation of the annuities in the event of wide changes in the value of gold are eliminated, although the upward scaling of the payments during the first thirty-six years offsets in part the increases which might have been effected as a result of greater prosperity or a major decline in the value of gold.

Germany is to be freed from external fiscal control. The system of controlled revenues and the industrial bonds are to be abolished. Aside from the 660 million gold marks provided through the railway bonds, a feature retained from the Dawes Plan, the Germans are left free to provide the funds by taxation or in any other manner that they may see fit. This means that Germany assumes also the responsibility of making the transfer payments. An international bank is proposed, to act as trustee

for the receipt and delivery of these payments, and to promote, in ways only vaguely outlined in the Plan, international financial co-operation. But Germany is obligated to deliver the full amount of the annuities, less any postponed portion and less any portion that may be "commercialized" by conversion into bonds for sale to private investors, to the international bank in foreign currencies. Commercialization does not relieve the German obligation, but whether these debt charges are to be met in foreign currencies or in payments within Germany would depend on the terms of issue. In so far as they were sold to foreigners, provision would undoubtedly be made for payment of interest and principal in foreign currencies. The protection of the transfer safeguard provision of the Dawes Plan is taken away, the only offset being the limited right of postponement of the conditional portion of the annuity.

The costs of armies of occupation are not to be a charge on the annuities, but are to be the subject of separate negotiation between Germany and the occupying power. As Germany is not likely to agree to bear the whole of this cost, the result may be an earlier evacuation of occupied territory.

Deliveries in kind are to be abolished after ten years, and the amount thus paid is to decline from 750 millions to 300 millions annually during the interval.

The Young Plan was the outcome of a series of compromises, arrived at only after a prolonged struggle, during which the whole undertaking was more than once in jeopardy. The creditor nations finally accepted a total of reparation payments far below any earlier figures, though this may represent, in part, a squeezing out of some of the water that went in originally under the guise of pension claims. Germany, on the other hand, faces the disadvantages that may accrue through the surrender of the transfer safeguard and the gradual abolition of deliveries in kind.

THE TRANSFER PROBLEM

It is unnecessary to elaborate here the theory of international payments on which the solution to the transfer problem rests. Broadly viewed, this problem confronts the Allied governments

in making their debt payments to the United States, just as it confronts Germany in paying reparation annuities. Put summarily, a nation's ability to make payments abroad will be measured in the long run by the excess of its exports of goods and services rendered to foreigners (i.e., the visible and invisible items of trade) over the imports of goods and services received from foreigners. It is of small avail if domestic production and domestic assets forge ahead, unless this expansion increases the surplus of total exports over total imports. Whether internal expansion will result in an export surplus or not will depend on the efficiency of its export industries and on the readiness of the rest of the world to accept its products. Internal development is not inevitably associated with an export surplus.

Unless a nation can consistently sell abroad, in the aggregate of visible and invisible items, more than is purchased abroad, the only methods by which it can continue to make payments abroad are (1) gold exports or (2) the proceeds of foreign loans.

It is evident that the exportation of gold cannot suffice to settle a prolonged series of foreign obligations of large amount. The withdrawal of gold quickly undermines the domestic currency and credit system, and large losses of this sort could have only one result, namely, the destruction of the domestic financial stability.

In the ordinary case of the adjustment of trade balances by the international flow of gold, the downward revision of prices as gold moves out of a country is supposed eventually to provide a corrective by checking imports and stimulating exports. Normally, countries with a stable financial system and a sound business situation have little to fear from such equalizing gold losses, since they may expect eventually a correction of the balance of payments which will restore the loss. But a fixed obligation payable abroad, such as the reparation annuities or the Allied debts to the United States, presents a complication which is not readily dealt with by the ordinary mechanism of gold movements and price changes. It is as if a large amount of imports had to be paid for regardless of the domestic price decline, but without the gain to internal industry and consumption that would come from an

actual import of goods or services. The question is whether Germany, with respect to reparations, or the Allied governments, with respect to their debt payments, would be able to exert sufficient influence upon their trade situation by internal credit restrictions or in other ways to realize the requisite funds abroad, regardless of the relation of ordinary imports and exports. This would mean drastic interference with imports and strenuous invasion of foreign markets.

The easier alternative, by far, would be a foreign loan. This is the normal method by which debtor countries settle large adverse balances. Most exporting countries expect to finance more or less of their foreign trade by lending the funds for payment. Eventually the interest remittances may exceed the debtor country's capacity to pay and then arises the question of scaling down the debt to a basis on which it can be carried.

Germany's trade situation since the Dawes Plan went into operation has been, in general, unfavorable. During three of the first four years the trade balance was heavily adverse, the exception being the second annuity year, 1925–26. The aggregate net excess of imports over exports during the four years was roughly 5,000 million gold marks, after making reparation payments and allowing for the foreign long-term loans. This excess was covered, according to Mr. Gilbert's conjectures, by short-term loans, an excess of foreign deposits in German banks, further disposal of German property held abroad, purchase of property in Germany and held there, and in other ways not susceptible of definite determination as to amount.[20] In view of this showing, the internal prosperity of Germany, as measured by the growth of production and of capital assets, has not provided the necessary volume of exportable—and exported—surplus which would yield the requisite annuity funds in foreign currencies. The source of these funds was, preponderantly, the foreign borrowings.

The details of the annuity payments and the foreign loans confirm this view. For the first four years the annuities totaled 5,470 million gold marks; but during the same time the total long-term foreign loans floated by the German states and their

[20] *Report of the Agent General*, December 22, 1928, pp. 141–43.

subdivisions, aside from the stabilization loan of 1924, amounted to 5,736 million gold marks. After allowing for amortization, this debt had probably been reduced by the end of 1928 to 5,400 millions, but these figures take no account of the short-term debt floated abroad within the same period. If the aggregate of the deliveries in kind be deducted, it will be apparent that the actual payments abroad have been materially less than the foreign borrowings. The delivery of German products as a form of reparation payment eliminates, to that extent, the transfer difficulty, since an actual export occurs. For this reason the gradual abolition of the delivery in kind may add to the transfer difficulties, since there may not readily develop a substitute market for the goods that were thus used to pay the foreign obligation.

In one sense Germany has paid the reparations bill presented to her by the Dawes Plan, by the imposition of heavy taxes on her people, and by the addition of burdensome charges to industry. But in another sense Germany has not paid it—the long-term bonds floated abroad just about equal the settlements thus far made. This process means simply an exchange of creditors. Those who bought the bonds of German states and cities so freely during this period provided, in one sense, the funds for these settlements, and they did it without having received an equivalent value in German goods. Whether these purchasers of German bonds recover their advances will depend on the future solvency of the debtor units.

There was no intent to deceive in this wave of foreign borrowing. The German states and cities had need of capital, and the agent general has said that these funds were applied to the creation of values in excess of the sums borrowed. Yet the most conspicuous instance of his interference with German internal affairs, perhaps, is found in his note of October 20, 1927, in which the tendencies toward excessive expenditure and overborrowing on the part of the states, cities, and communes were criticized.[21] There was need within the country for capital, without doubt. But the fact that foreign loans were necessary is, in itself, the clearest evidence of Germany's heavy internal burden and ad-

[21] *Ibid.*, 1926–27, pp. 340 ff.

verse trade balance. The exports of goods and services were not sufficient to pay for the imports, for reparations, and to provide working funds in addition for the reconstruction and expansion work that needed to be done. Foreigners supplied these funds, thereby providing a supply of foreign exchange by which the transfers to the Allied creditors were made.

Quite evidently, however, this method cannot last indefinitely, as the credit resources of German political units must eventually be exhausted. More than this, the burden of interest payments on the foreign debts mounts rapidly as such loans increase, thereby adding to the volume of fixed payments that must be made abroad regardless of the trade situation.[22]

The countries which owe war debts to the United States or to Great Britain are in much the same situation in this regard as is Germany. None of these debts can be paid in any other way than by the development of a surplus of exports, goods and services together. It is impossible to go into the question here of the ability of each of these countries, large and small, to develop and sustain an export surplus during the next sixty years. Some of them may be able to do this, and thus to pay their debts in full according to the agreements already ratified. Others may not be able to provide the necessary export surplus, and for these there must be a substitution of creditors through a series of foreign loans.

The maintenance of an export surplus is rendered more difficult, for any country, by the existence in other countries of restrictions on trade. The greater the number of countries in which such restrictions have been set up, and the more severe these restrictions are, the less is the opportunity for any given country

[22] Mr. George P. Auld, in *The Dawes Plan and the New Economics* (New York, 1927), takes the position that the transfer problem is a myth, since it is perfectly proper for foreign investors to supply, over an indefinite period, the funds for effecting the transfer, by making loans to Germany. Eventually, he holds, the German need for capital will be satisfied, and Germany will then have an export surplus which will enable her to make the transfers on her own account, as well as the debt charges. Professor Taussig sees no prospect of a sufficient German export surplus for a long time to come. "Deutschlands Internationale Handel und das Reparations Problem," *Archiv für Sozialwissenschaft und Sozialpolitik* (October, 1928), LX, 25.

which is seeking to build up an export surplus to find suitable markets in which to sell its goods. The end of the World War found nationalism in full swing, and this manifestation of the desire for security in a world that seemed to be falling to pieces stimulated a tightening of tariff barriers and other trade restrictions everywhere. The Young Plan suggests that one function of the proposed international bank will be to assist in the promotion of trade with undeveloped countries. Whether the group of central banks which is to control the Bank for International Settlements will permit extensive activity of this sort remains to be seen: the proposal is, however, not only a recognition of the universal desire for foreign markets, it is also to be read as an intimation that the bank will thus assist debtor countries to obtain transfer funds by aiding them in gaining access to foreign markets.

NATIONAL VIEWPOINTS AND POLICIES

Before the threads of this difficult problem can be drawn together, the third element in the situation must be surveyed. This is the question of the American viewpoint and policy. The first aspect of this matter is whether or not there is a connection between reparations and inter-Allied debts that is significant for the people of the United States. Despite the official disregard of this possible relationship, there are not only indications that this official viewpoint is not everywhere accepted, but there is evidence to show that the American people are actually involved, willy-nilly, in this web of international financial adjustment.

A second aspect of the situation is whether the best interests of the American people lie in the direction of strict insistence on the discharge of these varied and interconnected obligations, or rather in the direction of a general write-off which would further reduce or even eliminate these international obligations entirely.

During the Peace Conference a general adjustment or cancellation of the intergovernmental loans was suggested, but this idea was promptly rejected by the United States Treasury officials, who pointed out that inasmuch as the United States had paid in full for all supplies and services bought from Great Britain, France, and Italy, and was not, therefore, a debtor to any of

these countries, it had nothing to gain from cancellation. Great Britain, on the other hand, was both debtor and creditor, and so, in much less degree, was France. These countries could forgive their debtors to the same extent that their debts were forgiven them and gain correspondingly, but the United States could gain nothing thereby, since it was unthinkable to ask for a refund in cash for the disbursements made abroad for war purposes.[23]

Notwithstanding this clear statement, Mr. Lloyd George wrote to President Wilson on August 5, 1920, saying that England could not remit the debt due her from France except as part of an all-round adjustment, using in part the following language: "I need not go into the reasons which lead to this conclusion which must be clear to you. But the principal reason was that British opinion would never support a one-sided arrangement at its sole expense. . . . ."

The interesting fact is that an all-round adjustment would have amounted to cancellation by the United States, a one-sided arrangement, under circumstances against which public opinion in the United States would probably have been as strong as Mr. Lloyd George knew it would be in England against the alternative plan. President Wilson pointed out once more, in his reply, the inability of administrative officers to act in this matter without the sanction of Congress, and asserted it to be highly improbable that public opinion in this country would consent to a cancellation or reduction in the debts of any of the Allied governments as an inducement toward a practical settlement of the reparation claims. But he then added a sentence which suggested the connection between Allied debts and the settlement of reparation claims, a connection which the United States has always officially denied. The sentence was this: "As a matter of fact, such a settlement [i.e., of reparations] in our judgment would in itself increase the ultimate financial strength of the allies."[24] The inference is that with the reparations question settled, and a certain volume of payments

[23] Cf. Letter of Secretary Houston, March 1, 1920, to the British chargé d'affaires, reprinted in *Combined Annual Reports of the World Foreign Debt Commission*, pp. 68–69.

[24] These letters are reprinted in the *Combined Annual Reports of the World War Foreign Debt Commission*, pp. 72–74.

coming in, the debtors to America would be better able to pay their debts here. In other words, since the money was to be collected from Germany, the Allied governments need not worry much about paying their debts to the United States.

There are certain provisions of the Young Plan which indicate that reparations and inter-Allied debts are tied together. While the United States did not officially participate in the work of the second commission of experts, and cannot be officially bound by its findings, the fact that prominent American citizens were so influential in shaping this Plan cannot be entirely overlooked. It is provided in the Young Plan that if any reparations creditor should receive a concession with respect to its war debt payments, Germany shall be given a credit against the annuities of two-thirds of the net reduction if this concession is granted at any time within thirty-six years, and a credit of the entire net reduction if the concession is granted after the first thirty-six years.

In sweeping away the transfer safeguards set up by the Dawes Plan and authorizing in lieu thereof a postponement of not more than two years for the conditional portion of the annuity, the Young Plan places reparation payments on a basis similar to that of the debt settlements, in which no recognition was given of transfer difficulties except by authorizing a delay of not more than two years. This explanation is not offered in the text, but the practical effect is to establish the same conditions against Germany as the United States has established against its debtors.

Likewise, the elimination of the provision for correcting the annuity on account of changes in the value of gold removes another dissimilarity between reparations and debt settlements.[25]

The most obvious evidence of the interrelationship is found in the process of ring settlement that has been going on in recent years. The Allied governments have made their payments to the United States Treasury according to the funding agreements. They have collected reparations payments from Germany in accordance with the annuity schedule of the Dawes Plan. Germany has borrowed from foreigners, in the United States and

[25] The Midland Bank suggests, in its letter of June–July, 1929, that this may have been done for the purpose of establishing a closer agreement between the terms of payment in the two cases.

elsewhere, on long-term loans, an amount about equal to the annuities paid. If the deliveries in kind be deducted, the volume of transfer payments in foreign currencies becomes considerably less than the foreign borrowings.

In view of these considerations, it is difficult to avoid the conclusion that the American people are involved in this problem of international financial adjustment. They have contributed substantially to the funds drawn upon by Germany in transferring reparation payments. These payments, in turn, became the backbone of the Allied debt settlements to the United States. The United States Treasury has applied these debt payments toward the extinction of the federal debt. One group of American citizens, holding federal debt obligations, has been paid off, wholly or in part, and another group, the purchasers of foreign bonds, has supplied, in this roundabout way, the funds for this redemption. The American people have become involved in this process of international settlement. Viewed as a whole, they have been exchanging federal debt obligations for the securities of foreign states, cities, and industries. Just how advantageous in the end such an exchange will prove to be remains to be seen.

The other question of practical importance is, Where does the advantage lie? Does it lie in strict insistence on the fulfilment of these obligations, or in a further readjustment, even a complete cancellation? The Young Plan gives a certain universality to the Balfour principle, by assuring to Germany a share of the benefits that may come from further debt reduction, thus placing responsibility for the whole adjustment on the United States. Where does the balance of advantage lie for the American people?

On the one hand, strict insistence on the settlements already in effect would mean a continuance of the process of substitution of debtors described in the foregoing. Assuming that American investors continue to supply a substantial portion of the funds required in the transfer of the reparation and debt payments, they would thereby gain relief from the federal taxation that would be required to redeem the federal debt represented by the foreign loans. The investor class would have a mass of foreign securities, good, bad, and indifferent, from which something

would eventually be realized, and it would be spared so much of federal taxation. Balancing the reduction of federal taxation against the prospects of realizing eventually on the foreign loans, the advantage, so far, would appear to lie on the side of adherence to the existing program.

The national policy of high tariff barriers is, of course, thoroughly inconsistent with the policy of strict insistence on debt payment. The greater the restrictions on the American market, the less is the opportunity for foreign debtors, public and private, of obtaining the means of payment here through the sale of goods and services to the American people. Insistence that the debts be paid, despite the restricted trade facilities, will result in a greater demand on the American investors to supply, through foreign loans, the necessary means of payment.

On the other hand, the outflow of American capital to support reparation and debt transactions diminishes by so much the opportunity of selling American goods abroad. The United States has gained the position of a creditor country, and, as such, it is obliged to make credit advances to its customers in other countries. While the present trade situation prevails, foreign purchasers of American goods must be helped to buy, since their own exports do not suffice. This is a normal obligation for a creditor country. The difference between the economic advantage of such loans and those made to enable foreign countries to settle their war obligations is simply the difference between lending a man the money to pay for a live horse as against lending to finance his purchase of a dead one.

The argument boils down to the proposition that while the debtor countries are paying their war obligations, whether from their own resources or with funds borrowed in the United States, they are not as good customers as they would be if there were no debts of this sort to be paid. Heavy taxes reduce the buying power of the people. The desire to establish an export surplus leads, where possible, to restrictions on imports. Since the raw materials which sustain their industries cannot in safety be curtailed, these restrictions are likely to bear most heavily on the imports of food and other essentials of the standard of living and on the numerous products of American manufacture for which a

foreign market is being sought. The United States must face the question whether the collection of debts due to it, and the collection of reparations from Germany by those countries claiming such payments, will not introduce dislocations in American industry or prevent the elimination of existing dislocations to an extent which would more than neutralize the advantage which might be derived from a strict insistence on its legal rights. The indications are that there is more to be gained from relinquishing these rights than from insisting upon them. The sanctity of international obligations, stressed by Mr. Mellon, has been upheld by the ratification of the debt agreements. Release of these debtors will mean a greater buying power for current American products, whereas insistence on debt collection means payment for food, munitions, and other war supplies delivered more than a decade ago and consumed destructively rather than productively. It is the case of the live horse against the dead one.

The bearing of this question on the agricultural situation and on the industrial situation is especially significant. The American farmer's troubles are usually diagnosed as the result of overproduction, low prices and unscientific methods leading to high costs. An extension of the market for farm products would do little or nothing to stimulate the introduction of better or more scientific methods of agriculture. But it would improve prices, increase agricultural profits, and thus contribute to clearing the gloom and uncertainty which have hung for so long over the farmer.

Industry has likewise been threatened by a spread of the pessimism now pervading credit circles. The prompt inauguration of the so-called "sunshine" campaign, under presidential leadership, may suffice to avoid the worst excesses of a business depression. Trade and industry would be stimulated by the buying power that would be released by a remission of the debts. The countervailing consideration of federal taxation on the next generation for the redemption of the debt that would not be paid by Europeans, being as yet remote, would detract little from this stimulus.

The significance of the debt situation for American prosperity was very clearly put by Mr. Mellon in his statement made in

support of the settlements made by the Debt Funding Commission. Certain passages from this statement are here quoted:

> Europe is our largest customer. Unless the finances of Europe can be restored, her currency placed on a sound basis, and her people able to earn and spend, this country will not be able to dispose of its surplus products of food, materials, and goods. Our exports to Belgium last year were $114,000,000 and imports $66,000,000. Our exports to Italy were $185,000,000 and imports $75,000,000. Of the total exports to the two countries 26 per cent were foodstuffs and 36 per cent were cotton. Nearly two-thirds of the exports represent the surplus products of the American farmer. . . . .
>
> The countries of Europe must be restored to their place in civilization. In this process of reconstruction certain essentials have to be met: First, the budgets must be balanced. This is a domestic question for each nation to solve. Second, payments coming due in the future must be ascertained. Interallied debts constitute the principal item in this essential, and in order that their settlement be effective the terms must be definite in amount and time and within the capacity of the debtors. We have learned the folly of imposing indefinite and impossible terms from the experiment with Germany before the Dawes plan. And, third, America with its excess of capital seeking profitable investment, must aid by making private loans to Europe for productive purposes. Only from these private loans during the past year have the countries abroad been able to pay for our wheat and cotton. It is these new loans which make our exports possible. . . . . The American producer needs these debt settlements. *The entire foreign debt is not worth as much to the American people in dollars and cents as a prosperous Europe as a customer.*[28]

The whole thing is put in a nutshell in the last sentence. The American people would gain more in the next sixty years from having a prosperous and peaceful Europe as a customer than they can possibly gain from collecting the debts.

It was Mr. Mellon's view, however, that a basis of debt payment had been established in these settlements that would let the United States collect, and at the same time have a group of prosperous customers across the Atlantic. Of this there is no evidence; on the contrary, such evidence as the Debt Commission's annual reports contain relative to the financial capacity of some of the debtor countries suggests the opposite.

From this hasty summary of the inter-Allied debt problem and the German reparations problem, certain conclusions appear.

[28] *Combined Reports of the World War Foreign Debt Commission*, pp. 341–42. Italics not in the original.

First, the key to the whole situation is in the United States, not in Paris, London, or Berlin.

Second, if a general policy of payment is insisted upon and if the financial stability of Europe should thereby be shaken, there can be no advantage to any creditor country that will offset its losses.

Third, if the American people continue to lend abroad to sustain the reparations and debt payment program, the result will be a mere substitution of debt obligations that will be of doubtful ultimate advantage here.

Fourth, the economic well-being and advancement of the American people is worth more, as Mr. Mellon says, than the entire amount of the debt. If this means anything, it means that the American people have more to gain by promoting European prosperity and buying power than by insisting on the strict letter of their engagements.

Therefore, in the interests of an all-round recovery, both in the United States and in Europe, it would be better to remit these debts than to collect them. This conclusion is based deliberately on materialistic grounds. The arguments on either side of this vexed question which appeal to humanity, morality, law, or ethics have been avoided here, from a realization that every moral argument on one side could be confronted by what some would regard as an equally strong moral consideration on the other. Such debates are usually a draw. Since it appears that in the matter-of-fact realm of economic advantage the balance lies on the side of cancellation, there seems no escape from the conclusion that this would be sound policy.

The details of such conditions as might be set up are not considered here. The connection between Allied debts and reparations is sufficiently close that any action looking toward remission of war debt should be accompanied by an adjustment of reparations. The way for this has been cleared by the concessions that have been set forth in the Young Plan. Reparations, inter-Allied debts, and prosperity, here and abroad, are linked together.

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THE GENERAL PROPERTY TAX AND THE FARMER

THE growing burden of property taxes has frequently been advanced in recent discussions of farm problems as one cause of the long-continued agricultural depression. Taxes are always unpopular, and to have taxes rise when incomes are falling seems intolerable. Yet this has occurred. Moreover, while falling prices and rising costs may seem beyond human control, the rise of taxes is not generally accepted as inevitable. The annual tax seems an arbitrary sum, bringing no obvious benefit. And the responsibility rests, apparently, with elective officials who can be influenced by sufficient agitation. Neither the gains accruing to the taxpayer from, nor his responsibility for the rising rate, are very clear. Consequently this particular cost has been emphasized more, perhaps, than the facts justify, as a cause of farm distress.

Heavy property taxes can hardly be regarded as a cause of depression, but they have intensified it—increasing, as they have, most rapidly in the years of lowest return. The total amount of property taxes now paid annually on farm property is about four times the amount paid twenty years ago. Making allowance for changes in the purchasing power of money and changes in the quantity of farm property, taxes per acre are about double what they were in 1909. Taxes absorbed 13 per cent of "rent before the deduction of taxes" in the five pre-war years 1909 to 1913. They absorbed 34 per cent of such income in the five years 1923–24 to 1927–28. The purchasing power of farm income available as return for property investment an acre, in 1927–28, was only 95 per cent of the purchasing power of such income an acre in 1909, as compared with the 111 per cent of 1909 purchasing power which it would have been if taxes had not increased disproportionately. These data are given for the entire period in Table I and Figure 1. The comparisons given above are only a few of the many ways of estimating the growing tax burden, but they should be sufficient to demonstrate that the increased burden is a matter of serious concern.

This rapid growth in taxes is not peculiar to agricultural regions. The frequent statements that agriculture is more heavily burdened than other industries are somewhat misleading.[1] This is true only in so far as agriculture involves a heavier investment

TABLE I*

INDEX OF TAXES AND RENT PER ACRE OF FARM LAND, IN TERMS OF UNIFORM PURCHASING POWER†
(1909 = 100)

Year	Taxes	Rent before the Deduction of Taxes	Rent after the Deduction of Taxes
1909	100	100	100
1910	100	157	166
1911	104	126	129
1912	107	113	114
1913	118	140	143
1914	130	151	155
1915	137	162	166
1916	141	170	175
1917	130	202	214
1918	126	246	264
1919	126	259	279
1919–20	130	158	162
1920–21	163	33	13
1921–22	215	55	30
1922–23	207	93	75
1923–24	211	95	78
1924–25	211	113	98
1925–26	207	124	111
1926–27	211	106	90
1927–28	211	111	95

* Figures through 1919 are for the calendar year. Beginning in 1919–20 figures are for the year ending June 30. Tax figures through 1919 are from L. M. Graves, "Interest and Taxes in Relation to Farm Income," *Annals of the American Academy of Political and Social Science*, CXVII (1925), 37. Income figures for the same period are from L. H. Bean and O. C. Stine, "Income from Agricultural Production," *ibid.*, CXVII (1925), 29. Figures for both income and taxes from 1919–20 on are from E. H. Wiecking, "The Farm Real Estate Situation, 1927–28," *United States Department of Agriculture Circular No. 60*, December, 1928. The figure for "rent" is net income after allowing the farmer wages for labor; that is, return for property investment. The methods of estimating this item differ somewhat in the two sources, but the difference is not material. The 1928 figure for taxes has been estimated by the writer.

† Deflated by general price index of the Federal Reserve Bank of New York.

in real estate. Rural real estate, as such, pays no more in taxes, in proportion either to its capital value or its income, than city property. A study in New York State shows that the average tax rate on the full value of urban property was $2.44 in 1927, while

[1] E.g., C. O. Brannen, "Taxes in Relation to Earnings of Farm Real Estate," *Annals of the American Academy of Political and Social Science*, CXVII (1925), 42; R. Stewart, "Farmer's Tax Burden," *American Review of Reviews*, LXXVI (1927), 69 ff.

that on rural property was only $2.08.[2] The results of recent investigations in five states, given in Table II, indicate that urban property, compared with rural property, pays a slightly higher percentage of "rent before the deduction of taxes" in three states, and a slightly lower percentage in two.

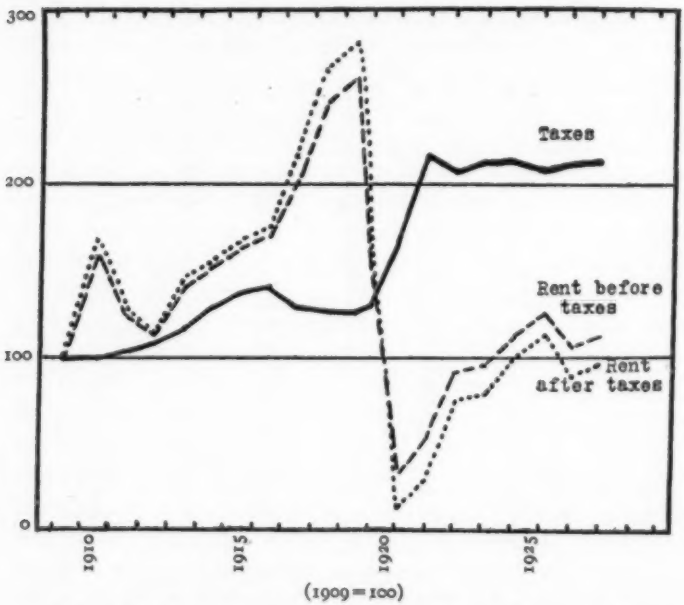

FIG. 1.—Index of taxes and rent per acre of farm land, in terms of uniform purchasing power.

When it is considered further that a large proportion of the direct improvements to city property is paid out of special assessments on such property not included in these figures, the burden

[2] Estimates made by the writer. The figures are for thirty cities, and for districts outside of cities and villages, in thirty-five counties. The counties selected are those more than two-thirds of the area of which is devoted to farming and which contain no cities of 100,000 population or over. If four more counties, containing seven more cities, are added (counties more than two-thirds of the area of which is in farm land, but which contain cities of 100,000 population or over) the discrepancy is even greater. The rate for these thirty-nine counties is $2.45 for urban property and $1.86 for rural property.

on urban property would seem to be greater, rather than less, than that on rural property. Rural property benefits much less frequently than urban property from direct improvements, but even more rarely does it pay for such improvements in special assessments.

Demonstrating that farm real estate is not paying a heavier tax than city real estate is not, of course, proving that real estate as a whole is not overburdened. This is a matter of vital concern to the farmer. Eighty-seven per cent of his investment in tangible property is in real estate, whereas only 56 per cent of all tan-

TABLE II

URBAN AND RURAL TAX BURDENS

State	Year	Number of Cases		Percentage of "Rent before the Deduction of Taxes" Paid in Taxes for	
		Urban	Rural	Urban Real Estate	Rural Real Estate
Colorado*	1926	120	180	27.1	23.8
Iowa†	1927	531	862	31.3	28.7
North Carolina‡	1927	859	416	29.5	28.9
South Dakota†	1926	151	142	28.3	29.8
Virginia†	1926	840	1094	16.0	20.0

* W. Coombs, L. A. Moorhouse, and B. D. Seeley, "Some Colorado Tax Problems," *Colorado Experimental Station Bulletin 346*, September, 1928.

† J. E. Brindley and G. S. M. Zorbaugh, "Tax System of Iowa," State College of Agriculture and Mechanic Arts, *Extension Bulletin No. 150*, January, 1929.

‡ North Carolina, *Report of the Tax Commission* (1928).

gible property in the United States is estimated to be taxable real estate.[3] It is a commonplace that the general property tax has become essentially a tax on real estate, as a result both of evasion and of legal exemption of personalty. But this is not without justification. In some instances the income tax has been imposed as a direct substitute for the property tax on some classes of personalty.[4] Moreover, real estate values frequently increase as the direct result of improvements paid for from the proceeds of the property tax. And there is always the possibility of *capitalization*

[3] United States Department of Commerce, Bureau of the Census, *United States Census of Agriculture 1925, Summary by States; Census of Wealth, Debt and Taxation, 1922.*

[4] E.g., Massachusetts, New Hampshire, New York, North Dakota, and Wisconsin.

of the tax on land. Consequently, the tax rate on the full value of real estate may exceed that on the full value of personalty without being unreasonable.

There seems to be no measure of a "fair" tax on real estate. It can be, and has been, amply demonstrated that the farmer pays a large percentage of "rent before the deduction of taxes" in property taxes. Thirty per cent and over is by no means unusual.[5] If the property tax is to be accepted as of the nature of an income tax, and many people seem so to regard it, this is clearly unreasonable, for it is a much higher percentage of net income than is taken by any ordinary income tax. If, however, the tax is considered in its true light as an essential cost of landholding—a cost which is to some extent predictable, and to that extent subject to capitalization—neither this percentage nor the ratio of taxes to full value gives any measure of the burden.[6] Once fully capitalized even the heaviest tax is burdenless—burdenless, that is, to the new owner who discounts the tax before making the investment.

Here lies the real difficulty. The farmer has lived on hoped-for increases in land values. It is impossible to say to what extent the general property tax has been foreseen and capitalized. But the general property tax is, and has been for a long time past, one of the larger costs of agricultural production—a cost which must be deducted before obtaining the net income which determines the value of farm real estate. It is not a fixed amount, like interest on a mortgage, which can be readily predicted for some years in advance; but it is more constant than many other factors influencing income and therefore capital value. Certainly no one familiar with our tax history would anticipate any reduction in this cost. The current tax at least should, and ordinarily must, be anticipated.

[5] The Bureau of Agricultural Economics of the United States Department of Agriculture has recently made a series of studies in co-operation with state agricultural experiment stations. These are too numerous to be listed here, but the average percentage of taxes to "rent before the deduction of taxes" varies in more recent years from 17 per cent in Arkansas in 1925 to 55 per cent in Michigan in 1926.

[6] Except, of course, relatively, between place and place, and one year and the next.

The fact is, of course, that capitalizing future income is at best, a hazardous process; and in agriculture, where supply, and hence price, is largely at the mercy of unorganized producers and the weather, the risk is peculiarly great. But in spite of the resulting uncertainties in income the farmer has regularly capitalized the hope of a larger income, and anticipated a rising land value. And he has not been without justification in this. Since land is limited and population grows, land values do rise. The value of farm land per acre rose 108 per cent between 1900 and 1910, and 77 per cent between 1910 and 1920. If these increases are deflated, however, to allow for the decreased purchasing power of the dollar, that for the former decade is materially reduced, and the gain for the latter decade is converted into a loss. Increasing productivity per acre has easily met the growing demand arising from a growing population, and land has not had the scarcity value which might have been anticipated. Since 1920 land values have fallen more than the purchasing power of the dollar has increased. The possibility of obtaining from rising land values compensation for low current income is becoming yearly more remote.

The value of farm property and its income and the rate of return on property are given in Table III for a period of twenty years. The rate of return also appears in Figure 2. During this period farm property has yielded about 5 per cent[7] on the average on its current value, after allowing the farmer and his family the farmhand's reward for their labor. The average rate of interest paid on farm mortgages is nearly 7 per cent;[8] the average rate paid on the value of cash- and share-rented property is about the same;[9] and land values in terms of purchasing power have

[7] The arithmetic mean of rates is 5.1 per cent if property values are taken as of the beginning of the income year, and 4.9 if values are taken as of the end of the income year. The median rates are 4.6 per cent in both cases. In making these computations the year 1919–20 has been excluded since the income in this year duplicates in large part that of 1919.

[8] Seven per cent in the earlier years of this period and 6.7 per cent in the later years (Graves, *op. cit.*, p. 37).

[9] For the five years 1919–20 to 1923–24, 6.9 per cent (Bean and Stine, *op. cit.*, p. 30).

declined. Five per cent, consequently, is not enough. The owner-operator who mortgages or rents a part of the land he cultivates makes much less than this 5 per cent on his own investment. According to estimates made by Wiecking[10] only 56 per cent, on the average, of the capital invested in agricultural production belonged to the operator during the period 1919–20 to

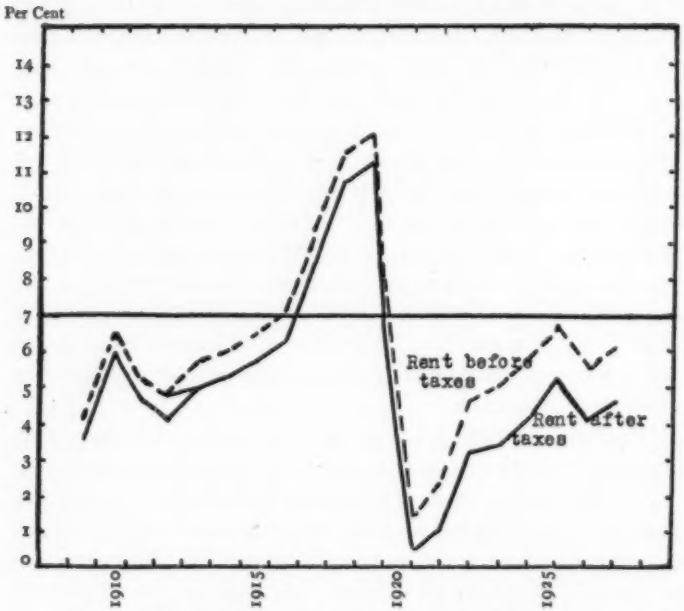

FIG. 2.—Rate of earnings on investment in farm property, 1909–1928

1927–28. The income available for the total capital investment amounted to 3.7 per cent of the current value of the total investment during this period, but that available for the owner-operator's investment came to only 1.8 per cent.[11]

For three years during this period, the war years 1917 to 1919, farm income kept sufficiently ahead of the capital value of farm property to yield a rate in excess of 7 per cent of the value of that property. But this unaccustomed income was generously

[10] Wiecking, *op. cit.*, p. 14.

[11] Wiecking, *op. cit.*, p. 14.

capitalized. The purchaser of farm land has regularly capitalized—and overcapitalized—not the almost certain increase in his taxes, but the far less certain increase in his rents. In 1919, the year of maximum farm income, the capitalized net rental of farms in ten counties in ten north-central states varied from

TABLE III

EARNINGS ON INVESTMENT IN FARM PROPERTY, 1909–28*

INCOME YEAR†	VALUE OF FARM PROPERTY PER ACRE, (JANUARY 1)	RENT PER ACRE BEFORE TAXES	RENT PER ACRE AFTER TAXES‡	PERCENTAGE WHICH RENT IS OF VALUE OF PROPERTY§	
				Before Payment of Taxes	After Payment of Taxes
1909	$45.78	$1.89	$1.63	4.1	3.6
1910	47.10	3.06	2.79	6.5	5.9
1911	47.66	2.46	2.17	5.2	4.6
1912	48.01	2.29	1.97	4.8	4.1
1913	50.14	2.86	2.51	5.7	5.0
1914	51.23	3.09	2.71	6.0	5.3
1915	52.53	3.44	3.03	6.5	5.7
1916	56.96	4.07	3.58	7.1	6.3
1917	61.21	5.74	5.20	9.4	8.5
1918	68.14	7.84	7.26	11.5	10.7
1919	75.79	9.12	8.46	12.0	11.2
1919–20	83.64	6.17	5.29	8.1	7.0
1920–21	76.99	1.24	.39	1.5	.5
1921–22	67.67	1.74	.83	2.3	1.1
1922–23	66.75	3.14	2.15	4.6	3.2
1923–24	65.02	3.21	2.25	4.8	3.4
1924–25	64.66	3.83	2.87	5.9	4.2
1925–26	64.62	4.31	3.34	6.7	5.2
1926–27	63.09	3.69	2.70	5.7	4.2
1927–28	61.83	3.84	2.84	6.1	4.6

* Based on data given in *United States Census of Agriculture, 1925;* National Bureau of Economic Research, *Income in the United States*, Vol. II; Wiecking, *op. cit.*, p. 14.

† Calendar year through 1919. Year ending June 30 from 1919–20 on.

‡ "Rent" computed as in Table I.

§ Taking property value as of the beginning of the income year. Since the larger part of the income for those years ending June 30 is realized in the six months prior to January 1, the property value for January 1 of the year preceding is used from 1919–20 on. Thus the property value for 1919–20 is as of January 1, 1919, and so on.

about one-fourth to one-half of the census valuation for that year.[12] In six of these ten counties it was less than one-third of such valuation. The estimates in Table III show that for the country as a whole the income for that year justified the property valuations—but only for that year. In 1920 property values rose

[12] Brannen, *op. cit.*, p. 41. The rate of interest used for capitalization was the prevailing rate for best mortgages in these localities.

even higher, and income decreased. The optimistic purchaser at these prices not only failed to discount future increases in taxes; he anticipated the continuance of current income when it was already at an unprecedented height, and after the cause of such large income had ceased to operate.

The farmer's optimism has not survived the long-continued depression, and property values have dropped. Since 1925 the ratio of net rent to property values has been slightly higher than it was before the war. The new values offer little comfort, however, to the purchaser at 1920 prices. Even at present prices the purchaser appears to be making an unprofitable investment. Nothing short of a 50 per cent increase in current income would justify these prices. Yet there is no immediate prospect either of such an increase in income or of material further reduction in capital values.

The difficulty goes much deeper than mere failure to anticipate increases in property taxes. The average yearly return to property during these twenty years (1909–28) amounted to 5.1 per cent of the capital value.[13] Had there been no property tax at all this return would have come to 6.1 per cent. Even 6.1 per cent is an inadequate return if the rate on rented farm property and on farm mortgages is a valid test. Yet the property tax was a well-established institution in 1909, and to assume that no tax was anticipated is absurd. Also property values were revised each year during the ensuing period with full knowledge of the previous year's taxes; and there was no reason to suppose that these taxes would be lower in the future. The annual increase, the only part of the tax which the owner might reasonably have failed to expect, cut only one-tenth of one per cent from the annual rate of return on capital value.

This being true, reducing property taxes can afford no permanent relief. Any decrease would mean a very real gain to the owner of property at the time of the reduction, but the record of the last twenty years indicates that the increase in net income resulting would be fully and promptly capitalized; and the sanguine purchaser following the tax decrease would pay a price

[13] Taking the value as of the beginning of each income year.

which would preclude his earning the 7 per cent which he will be required to pay on his mortgage.

Granting that the tax on rural real estate is no higher than the tax on urban, that there are good reasons for taxing real estate at a higher rate than personalty, and that the owner of farm property has not exercised reasonable foresight in valuing his property, it still does not follow that the taxes on real estate are not unduly high. The general property tax, most of which falls on real estate, produces about four-fifths of all state and local tax revenues. This is a very large share to be derived from any one source. Moreover, the inflexibility of the tax in periods of depression, and the injustice arising from unequal assessments, increase the hardship of a heavy rate.

To obtain any appreciable reduction in the tax burden on property involves cutting government expenditures materially, or developing other, and lucrative, sources of revenue. It is hardly to be anticipated that state or local expenditures will decrease, but there are various ways in which a part of the burden on real estate might be shifted elsewhere. As one possibility the states may continue to develop other tax sources and depend less on property taxes. This is quite probable. Four states levy no general property tax for state use;[14] and the percentage of state tax revenues from the general property tax in all states combined decreased from 45 to 27 between 1912 and 1927. The development of other sources has not kept pace, however, with growing state needs, and the absolute amount of state property taxes levied has nearly tripled in these fifteen years.

The majority of the states have still to adopt the personal income tax, a tax which bears lightly or not at all on the majority of farmers. Some states might profitably increase the rate of the gasoline tax. Others have unused opportunities in business taxes. All of these may well be developed. Nothing short, however, of a revolutionary revision of state tax systems will materially decrease state general property taxes; for demands on state treasuries are increasing at an unprecedented rate. Moreover, nearly 90 per cent of the property tax is a local tax. If the state tax were

[14] California, North Carolina, Pennsylvania, and Virginia.

given up entirely the tax burden on real estate would still be very heavy. The state might, of course, assume a larger share of the joint support of roads and schools, the functions which absorb the larger part of the local rural tax. This is being widely urged; and it is consistent with present state policies. State subventions for roads and schools, direct state expenditures for highways, and grants from specific tax revenues for general local use are growing rapidly.

Further increases of state aid will tend to equalize the burden throughout the state, and this will benefit some rural communities; but unless other state sources are developed far beyond their present use the shift to state support will only substitute a state tax rate for a local one; and the resulting equalization is as apt to militate against the rural district as in its favor. Thus, instead of obtaining relief from his tax burden, the farmer might find that the net result of the change had been to remove a larger share of his tax from his immediate control. The control of the tax rate in rural districts is in the farmer's own hands; but the roads and schools for which the proceeds are largely expended are essential to the rural community. As long as the farmer must choose between poor roads and schools with a low tax rate, on the one hand, and good roads and schools with a high rate, on the other, he will accept the latter as the lesser evil.

If current financial policies continue, an increase in the property tax burden is more probable than a decrease, however desirable a decrease might be. Certainly no material reduction can be hoped for. Should some decrease be achieved, here and there, it would bring relief to the farm owner at the time of the reduction. But if the farm owner persists in immediately capitalizing the added income at the low rates of return now accepted the gain in *rate* of return will be temporary only. Under these conditions, even drastic reform of state and local tax systems seems to offer nothing in the way of permanent farm relief.

MABEL NEWCOMER

VASSAR COLLEGE

THE RISE OF THE AMERICAN COTTONSEED OIL INDUSTRY

THE annual dollar value of American cottonseed and cottonseed products runs into a few hundred millions, and the seed from a bale of cotton approximates in monetary return a bale of lint cotton in earlier days. This development is due primarily to the extraction, or expression, of the oil from cottonseed; by 1890 this industry was important enough to be given a distinct place in the federal census and to have occasioned the formation of an important trust. The development after the Civil War has led one writer to observe that cottonseed was garbage in 1860, fertilizer in 1870, cattle feed in 1880, "table food and many things else" in 1890.[1] Indeed, many an antebellum cotton gin was set up on the bank of a stream so that the seed would be washed away. This practice called forth legislation, the *Revised Code of Mississippi* of 1857, for instance, providing a fine of $200 for dumping cottonseed in any stream used for drinking or fishing purposes. The same law contained a provision to prevent ginners from allowing seed to accumulate within half a mile of a city or village, as destruction or removal was necessary for reasons of health.[2]

Yet there were a few cottonseed oil mills in existence in 1860, and the industry had its beginnings long before this date, with experimentation, inventions, business ventures, and prophecies. Twenty-three years prior to the invention of the cotton gin a group of Moravians of Bethlehem, Pennsylvania, sent specimens of oils from cottonseed and from sunflower seed to the American Philosophical Society at Philadelphia. They had hulled the cottonseed and produced the oil in much the same way as linseed oil was made, getting six pints of oil from a bushel of seed.[3] Cot-

[1] F. G. Mather, "Waste Products: Cotton-Seed Oil," *Popular Science Monthly*, May, 1894, p. 104.

[2] *Twelfth Census of the United States*, IX, 558, quoting the provisions.

[3] J. L. Bishop, *A History of American Manufactures from 1608 to 1860* (Philadelphia, 1864), II, 81 f. A Dr. Otto, of Bethlehem, Pennsylvania, was active in

tonseed oil was said at this time to be used medicinally in the West Indies. In 1783 the London Society of Arts offered a gold medal for oil and cake made from cottonseed by a British West India planter, noting the value of the cake for cattle feed. This offer was not met, perhaps because it was conditioned on ton productions. The South Carolina Agricultural Society soon afterward offered a medal for oil from cottonseed and other oleaginous seed, and in 1799 a patent was granted to Charles Whiting, of Massachusetts, for extracting oil from cottonseed.[4] Attempts to produce cottonseed oil were made in South Carolina about 1815, some of them failing for lack of hulling the seed, though tests in lamps "in comparison with spermaceti oil" showed that the cottonseed oil "was decidedly the best."[5]

Additional efforts and experiments were made in the Carolinas and Virginia in the twenties. *Niles' Register*, May 15, 1824, cited the *Raleigh Register* on the subject of an "Interesting Discovery" by Professor Olmsted, of the University of North Carolina. He had "ascertained that a fine illuminating gas may be obtained from cottonseed," in the proportion of twice as much from a bushel as from New Castle coal. This use of cottonseed had been suggested by a Baltimore man, who had experimented with extracting oil from cottonseed and written an article on the subject. Southern cottonseed might illuminate nearly every city in the United States!

Machinery for the two essential processes of hulling or crushing the seed and pressing it was devised, operated, and sold in the late twenties and early thirties by Francis Follett and Jabez Smith, of Petersburg, Virginia, who attracted attention in the Carolinas and Georgia. These men wrote in 1833 that they had erected three cottonseed oil mills on their own account, while several mills of their manufacture had been set up by others, and that business based on their machines was "progressing . . . .

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this experiment and in putting it on record. There was, however, a much earlier origin, for in China in the seventeenth century cottonseed was sometimes ground for feeding to oxen and oil suitable for illumination extracted (United States Department of Agriculture, *Yearbook* [1926], pp. 259–60).

[4] Bishop, *op. cit.*, pp. 81 f.

[5] *Niles' Register*, October 3, 1829, quoting Columbia *Telescope*.

rapidly in the cotton growing states in the west." They claimed for their largest hulling machine a capacity of sixty bushels of hulled kernels in ten hours.[6] Two horses furnished the power; an air current from a fan separated the hulls and kernels after the seed was crushed between two revolving stones. Follett and Smith's pressing arrangement included haircloth envelopes in mortars, with pestles for forcing the oil out of the crushed seed as in the making of linseed oil.[7] Superiority was claimed for a machine of a different type in operation at Athens, Georgia. This machine used a block-and-spike system for hulling the seed, and the press that accompanied it sold for $750.[8] It was mentioned in 1829 that oil was being extracted from cottonseed at New York for 15 cents a gallon, or for 5 cents a gallon if the cake was retained at the mill, with a slight additional charge for refining the oil, and that Gideon Palmer was operating a machine at New London, Connecticut.[9]

It was asserted that cottonseed oil sold for 80 cents a gallon at Providence, Rhode Island, in 1829 and even for $1.00 a gallon at New York and Philadelphia in 1833, though the latter assertion was questioned.[10] Many uses for cottonseed products were already recognized. The cake was recommended as good feed for cattle and hogs. The oil was used in painting a house at Petersburg, Virginia, about 1826, and a Georgian anticipated its modern major use by discovering that "when fresh, it can be used in corn bread for the same purpose and to as good an effect as lard, having nothing offensive in smell or taste, the latter resembling that of a hickory nut."[11] It was tried as a lubricant for machinery. But the greatest hope at this time was for its use in lamps. In many accounts it was compared favorably with whale oil for this use,[12] and, if the Yankees were facing risks and hardships to explore the seas for oil, it seemed absurd for Southerners

[6] *Ibid.*, September 14, 1833.

[7] *De Bow's Review*, November, 1855, p. 601.

[8] *Niles' Register*, September 7, 1833, quoting *Southern Banner*.

[9] *Ibid.*, October 3, 1829; *Southern Agriculturalist* (Charleston), December, 1829, pp. 563–64.

[10] *Niles' Register*, September 14, 1833. [11] *Ibid.*, September 7, 1833.

[12] *Ibid.*, October 3, 1829, September 3, 1833, November 29, 1834, May 16, 1835.

to let their source go to waste. With the manufacture of cottonseed oil seemingly "about to become a large business," it was noted that "its introduction into common use would not be without some serious disadvantages, and especially in the destruction of the finest nursery for seamen in the world—to say nothing of the great amount of labor and capital vested in the whale fishery, by the people of the north."[13]

According to one optimistic comment in 1829 the surplus cottonseed had a potential oil value of $6,400,000, "a pretty item among the resources of a country."[14] One prophet said that the machinery for working cottonseed would probably rank in the cotton country second only to Whitney's invention of the cotton gin, while another said a little later, "The time will come when a man will just as soon think of throwing away his corn as his cotton seed."[15]

However, the interest in cottonseed oil so far was more journalistic than commercial, for it has been rather generally assumed that the first important undertaking to crush cottonseed in the United States was at Natchez, Mississippi, in 1834,[16] and one might well expect that it would be in the Mississippi Valley that successful establishment would be accomplished of a business that was dependent on the combination of abundant cotton crops and economical transportation. Among those interested directly or indirectly in the Natchez project were J. H. Cooper and Samuel Plummer, of Georgia, Major Anderson Miller, of Louisville, a Virginian bearing the name of Follett, and Archibald Dunbar, of Mississippi. Mills were started at Mobile, Alabama, and Florence, Georgia, about the same time, and late in 1835 the Louisiana legislature incorporated a "Cotton Seed Oil Factory and Insurance Company" to be operated at New Orleans. To encourage the new activity a resolution of the New Orleans city

[13] *Ibid.*, November 29, 1834.

[14] *Ibid.*, August 29, 1829.

[15] *Ibid.*, October 3, 1829, quoting Columbia *Telescope*, and September 7, 1833, quoting *Southern Banner*.

[16] Appleton's *Annual Cyclopaedia* (New York), 1889, pp. 240–41; *Twelfth Census of the United States*, IX, 590; L. L. Lamborn, *Cottonseed Products* (New York, 1904), p. 19.

council required the mayor to purchase cottonseed oil, presumably for city lighting.[17] Yet all these efforts were greeted with loss and failure.

In the forties and fifties New Orleans furnished still greater efforts toward making cottonseed oil production successful and permanent, with *De Bow's Review* supplanting *Niles' Register* as sympathetic chronicler. Distinct steps for producing cottonseed oil in New Orleans are recorded for 1847, 1852, and 1855, and the list of participants in the different undertakings includes *inter alia* Frederick Good, William Wilber, C. W. Bradbury, A. A. Maginnis, Paul Aldigé, Jules Aldigé, F. M. Fisk, and P. J. Martin. Good and Wilber improved the machinery, manufactured oil, refined it, made soap from parts of it, and also put cake on the market.[18] Their enterprise, however, was not financially successful, and it was said that Good was wont to exhibit a small bottle of oil with the statement that it had cost him $12,000.[19] Paul Aldigé in 1852 visited Marseilles to familiarize himself with the French manufacture of oil from Egyptian cottonseed. The supplying of soap stock was not the only new use for the oil that was finding interest in New Orleans, as it was pointed out that the refined oil from cottonseed was not distinguishable from Italian olive oil.[20] In connection with this new table use, a supporter of the industry was quoted as saying, "We dare not call it cotton seed oil lest it might prejudice the sale."[21] *De Bow's*, with skeptical hope, published, February, 1854, a summary of an article by Dr. Edward Jenner Coxe in the *New Orleans Daily Delta*, asserting that cottonseed oil was selling at New Orleans for $1.00 a gallon by the barrel, that the cake was worth 1 cent a pound, and that Southern cottonseed, after deducting one-half for plant-

[17] *Niles' Register*, May 16, 1835, quoting New Orleans *Advertiser*.

[18] H. V. Ogden, *Cotton Seed Oil and Cotton Seed Oil Mills* (New Orleans, 1880), p. 6.

[19] Lamborn, *op. cit.*, p. 19.

[20] *De Bow's Review*, February, 1854, pp. 203–5.

[21] J. A. Turner, *The Cotton Planter's Manual* (New York, 1857), p. 225, quoting a newspaper clipping stating that quantities of cottonseed oil had been mixed with linseed oil and with lard oil with the buyers being none the wiser.

ing purposes, had a potential value of $38,820,000.[22] A still larger claim was made by Charles Cist, of Cincinnati, who stated in *De Bow's Review,* July, 1859, under the subtitle "Proposed Revolution of Southern Industry" that cottonseed oil and cake offered the possibility of adding 50 per cent to the profit of the cotton industry, that from the crop of 1858–59 there might have been produced 87,000,000 gallons of oil, worth as many dollars, and enough cake at $25 a ton to raise the total to more than $100,000,000. He followed this claim with the advice that cottonseed be shipped to Cincinnati, "where any amount can be disposed of for manufacture there, or to supply orders for the east," and he mentioned a price of $14 a ton, or $10 net, less 5 per cent commission.[23]

In addition to this activity at New Orleans and Cincinnati in the fifties, there was mention of the operation or installation of cottonseed oil mill machinery at St. Louis, Memphis, and one or two Texas points.[24] A plant at Providence, Rhode Island, was reported as manufacturing the "purest oil," suitable for table use, from the "best Mississippi cotton."[25] Census estimates placed the number of mills in 1860 at seven, three at New Orleans and one each at Memphis, St. Louis, New York, and Providence. The reports for these seven establishments showed a total capital investment of $351,000 and an annual crushing of 50,000 tons of cottonseed, with raw material cost, $498,000, and value of the products, $741,000. The number of employees was 183, and the annual labor cost was $76,956.[26] Next to New Orleans in value of products was Memphis, and Providence held third place. The mills at Providence and St. Louis and one mill at New Orleans were destined to survive the Civil War.

Realization was trailing prophecy by a wide margin when the

[22] This statement was also summarized and emphasized by Andrew Ure, *The Cotton Manufacture of Great Britain Investigated and Illustrated* (London, 1861), II, 367–69.

[23] *De Bow's Review,* August, 1859, p. 222.

[24] *Ibid.,* October, 1860, pp. 511–12.

[25] *Ibid.,* July, 1858, pp. 114–15, quoting *Charleston Courier.*

[26] *Eighth Census of the United States, Manufactures,* p. 739.

Civil War interfered, though important uses for the oil and the feasibility of its manufacture had been demonstrated. The necessity of hulling the American seed, so different from the Egyptian sleek cottonseed, had also been established. More than a dozen patents for hulling machinery and processes had been secured, including that of Follett and Smith, in Virginia, and the later one of William R. Fee, of Cincinnati. The Fee patent seemed the most important in the fifties, and Fee machinery was used in Memphis, New Orleans, and St. Louis. It was designed to operate by a cutting or cracking process and to avoid grinding or mashing the seed, thus facilitating the separation of the hulls from kernels.[27]

No little criticism was manifested to the effect that the growth of the cottonseed oil industry, "so vital to Southern prosperity," was handicapped by a guarded secrecy as to machinery and processes.[28] Yet the successful development of this industry required less novelty of invention than application of mechanical engineering; and it was the lack of the latter element that hindered the early development, if we accept the verdict of a later-trained manufacturer of mill machinery. It was his observation that the earlier mills were built either by foreign or native Southern mechanics, "both of whom were dogmatic, opinionated and incompetent."[29]

Defective or imperfect machinery was not the only obstacle that hindered the development of the cottonseed oil industry in the fifties and even in the eighties. Time had to pass before industrial chemistry could give cottonseed products new uses and the seed higher prices, especially through the rise of compound lard and vegetable shortening. And cottonseed has never escaped dependence on cheap transportation, being in this respect similar to corn rather than to cotton. When cottonseed sold for from $5.00

[27] *De Bow's Review*, August, 1859, pp. 220–22; J. L. Watkins (cotton statistician) in *Encyclopedia Americana* (New York, 1929), VIII, 86. For this machine, patented in 1857, a crushing capacity of three tons of seed an hour was claimed. Fee was also successful in inventing a hydraulic press for extracting the oil.

[28] *De Bow's Review*, October, 1860, pp. 510–13; Lamborn, *op. cit.*, p. 21.

[29] D. A. Tomkins, *Cotton and Cotton Oil* (Charlotte, North Carolina, 1901), pp. 213–14.

to $10.00 a ton delivered to the banks of the Mississippi, transportation cost was distinctly a problem, pointed out by interested observers.[20] This problem stimulated the suggestion that small-scale manufacture of cottonseed oil be attempted on plantations. But the mechanics and economics of the situation did not permit the cotton farmer to get oil from his cottonseed as easily as the frontier corn grower had converted his crop into transportable spirits. It was also pointed out that an accompanying difficulty in the fifties resulted from unsound seed. The shift from exposing surplus seed to the weather to preserving them for sale was not instantaneous.

However, cottonseed reached a point of commercial value in the fifties, and attempts were made to continue or undertake oil production during the Civil War, even at New York.[21] By 1867 the status of the industry was about the same as in 1860 in number of mills, production, and the price paid for seed.[22] The post-war *De Bow's Review* gave additional preachment on cottonseed oil as offering an important bit of economic hope to the suffering South. There were twenty-six mills in 1870, more than forty in 1880, and a greater increase in the following decade. This expansion was marked by the development of such centers as New Orleans for refining the crude oil and also by an increase in the general efficiency of manufacture. While one of the early establishments might extract only thirty gallons of crude oil from a ton of seed, a later mill might get forty gallons, and in the early eighties the business was looked into from an engineering point of view, with consequent construction from the designs of experts.[23] One industrialist who contributed to this improvement was D. A. Tomkins, a Southerner, who secured technical training in the North and established himself at Charlotte, North Carolina, in 1882. "He organized and built within a few months a

[20] *De Bow's Review*, November, 1855, p. 601; October, 1860, pp. 510–13; *Hunt's Merchant Magazine*, March, 1857, p. 386; Appleton's *Annual Cyclopaedia* (1889), pp. 240–41.

[21] Lamborn, *op. cit.*, p. 21.

[22] Appleton's *Annual Cyclopaedia* (1889), pp. 240–41; Mather, *op. cit.*, p. 106.

[23] Tomkins, *op. cit.*, pp. 214–21.

chain of efficient cotton seed oil mills."[84] Complaint, however, was registered as late as 1890 over the leaving of oil in the pressed cake, which reduced both the yield of oil and the nutritive value of the cake.[85]

Destined to remain a regional cotton-belt development, the cottonseed-oil industry continued for years to hug the lines or points of water transportation. Among the forty-one southern mills in 1880, New Orleans had six, Memphis five, Nashville two, and St. Louis two, while among the other locations were Shreveport, Little Rock, Montgomery, and Augusta. Texas had six mills at this time, with complaints ten years later of seed congestion at rail shipping points.[86] A network of railroads was needed for the transportation of bulky seed to the milling centers, and sooner or later this need would be met.[87] The hulls of cottonseed furnished an important reason for thus holding the oil milling in the South, for in the early days the hulls, not far from half the seed by weight or one-third of the unginned cotton, were nearly worthless and difficult to dispose of. Used first only as fuel for the boilers that furnished power for the mills, they acquired a value of a few dollars a ton in the eighties and nineties as cattle feed in the cotton country, suitable as roughage to mix with concentrated feed like cottonseed cake. They were finding other uses also, such as for packing material and paper stock, and were proportionately reduced by improved machinery that got more oil, cake, residual lint ("linters"), and foreign substance from a ton of seed.

Ranking ahead of hulls and linters and next to the oil in economic value is the cottonseed cake or meal. By 1870 this part of the cottonseed was finding its way into commercial fertilizer, with fertilizer mixing not infrequently becoming a business allied to cottonseed oil milling. It was reported, for instance, in 1870 that the Panola Oil and Fertilizer Company at Memphis

[84] Broadus Mitchell, "Some Southern Industrialists," *Virginia Quarterly Review*, January, 1929, pp. 113–14.

[85] *Dallas Morning News*, January 12, 1890.

[86] *Dallas Farm and Ranch*, November 1, 1889.

[87] Ogden, *op. cit.*, p. 16.

planned to "convert their oil cake into a valuable fertilizer, by mixing with it bone-dust, plaster, salt, and ashes."[38] An undertaking for mixing fertilizer containing cottonseed cake had previously been started in Florida, leading to a successful plant at Atlanta.[39] This kind of fertilizer received increasing favor from the scientific observation that it was chiefly through the cake, not through the oil or the lint, that the cotton crop robbed the soil of valuable plant food, especially nitrogen. Using the cake in fertilizer for cotton growing would replace the plant food removed by the previous cotton crop as the product left the field. It would change cotton from one of the most exhausting to one of the least exhausting crops.[40] Constituting more than one-third of the seed by weight, the cake in 1880 had a selling price of $20 a ton. It was meeting with a demand as fertilizer, especially in the Southeast, and as cattle feed, especially in the Southwest. It became in the eighties an export item with a value of millions. It also became an important subject for study and experimentation at agricultural colleges, largely on account of the possibilities in the co-ordination of the feeding and fertilizing uses.

It was the oil, nevertheless, that gave the name, rise, and chief value to the industry based on cottonseed as its raw material. The promoters had prior to the Civil War considered this oil as a possible strong competitor of whale oil for illumination, but there was recognition by 1860 that petroleum might materially reduce this demand for cottonseed oil.[41] But its uses as an edible oil, which had been demonstrated in the fifties, were effectively emphasized after the Civil War. There was French complaint in 1880 that refined cottonseed oil was reaching France under the name of olive oil from Spain and Italy.[42] With New Orleans shipping 73,782 barrels to Europe, including 40,000 barrels to Italy, in the year ending August 31, 1879, there might be a question as to spurious olive oil, concerning which "the world

[38] *Report of the Commissioner of Agriculture* (U.S.) (1870), p. 448.

[39] Appleton's *Annual Cyclopaedia* (1889), pp. 240–41.

[40] *Report of the Commissioner of Agriculture* (U. S.) (1870), p. 248.

[41] *De Bow's Review*, October, 1860, p. 510.

[42] Adolphe Renard, *Huiles, graisses-beurres, cires* (Rouen, 1880), p. 26.

must draw its own conclusions."[43] The statistical connections between Italian imports of American cottonseed oil and Italian exports of olive oil in the eighties were suggestive of the *Atlanta Constitution's* comment on cottonseed oil that "frugal Italians placed a cask of it at the root of every olive tree and thus defied the Borean breath of the Alps."[44] The new product was destined to circle the globe in competition with olive oil and eventually under correct labels. It found its way to the Maine coast for sardine-packing, and certain grades continued to be used in the manufacture of soap in America and also abroad, as at Marseilles.

Still greater demands for cottonseed oil came through the manufacture of artificial butter and compound lard or vegetable shortening. The beginnings and developments of these uses were as surreptitious as had been its early use as an adulterant or substitute for olive oil, with the American dairyman or hog-raiser becoming the foeman in place of the foreign olive grower. It was also necessary to fight down the antipathy or prejudice of the consumer, as revealed in the statement, "Give me some pure hog lard, I don't want any of that old cottonseed stuff."[45]

The oleomargarine industry rose slightly earlier than the compound lard business, though furnishing less demand than the latter for cottonseed oil. Originating in France just before the Franco-Prussian War, it reached the status of patents and plants in the United States by 1873. The manufacture developed fairly rapidly in this country, with cottonseed oil becoming an important ingredient of the product, though not used in the first manufacture in France. When the dairy interests, not content with their state legislation, were securing the congressional legislation of 1886 to tax and regulate oleomargarine, they met opposition from the Cottonseed Crushers' Association of the South, and one Southern congressman declared that the dairymen's proposal would reduce the price of cottonseed from 20 cents a bushel to 10.[46] American cottonseed oil, however, was also finding its way

[43] Ogden, *op. cit.*, pp. 12–13.

[44] Appleton's *Annual Cyclopaedia* (1889), p. 241.

[45] *Dallas Cotton and Cotton Oil News*, January 1, 1929.

[46] *Congressional Record*, Forty-ninth Congress, First Session, pp. 5123, 5204.

into the foreign manufacture of oleomargarine. Holland, for the making of butter substitutes, was soon taking about one-third of the best grades of cottonseed oil exported from the United States.[47] By the end of the century the Dutch were receiving annually 200,000 barrels of American oil, while the domestic manufacture of oleomargarine, in spite of taxation restrictions, was furnishing annual consumption for 50,000 barrels.[48]

About 1880 cottonseed oil was introduced into hog lard to temper it for use in cold climates, and thus began a story that "is filled with the intrigues of competitive industries."[49] In the spring of 1883 compound lard, so a champion of hogs and grain complained, was an important factor in breaking a corner in lard.[50] The new product, it was estimated in 1888, constituted about half the total of 600,000,000 pounds of lard produced in the country and about two-fifths of 320,000,000 pounds exported, and this compound consisted of mixtures of hog lard, beef stearine, and cottonseed oil, with the oil estimated at 40 per cent.[51] A little later, it was calculated that the compound was making annually a net market displacement of 160,000,000 pounds of hog lard and furnishing consumption for one-third of the output of cottonseed oil.[52] Chicago was at this time the chief center of manufacture of the synthetic product, with Armour and Company and N. K. Fairbank and Company as the leading producers. Southern farmers were receiving millions for cottonseed, but it was asserted, on the other hand, that the new industry reduced considerably the value of 50,000,000 American hogs. The fight was on between industries, between farmers, and between sections, though the hog-raisers were unable to imitate the dairymen's successful drive for protective legislation.[53] Vegetable

[47] D. A. Tomkins, *Cotton Seed Oil* (Charlotte, North Carolina, 1902), p. 37.

[48] *Manufacturers Record*, February 20, 1902.

[49] United States Department of Agriculture, *Yearbook* (1926), p. 260.

[50] C. W. Davis, "Cotton Seed and Corn: Why the Price Is Low," *Forum*, February, 1898, pp. 731–33.

[51] *Report of the Commissioner of Agriculture* (U.S.) (1888), pp. 248–49.

[52] *House Reports*, Fifty-first Congress, First Session, No. 970.

[53] H. C. Nixon, "The Cleavage within the Farmers' Alliance Movement," *Mississippi Valley Historical Review*, June, 1928, pp. 22–33.

shortening held its own, remaining the chief channel for the consumption of cottonseed oil and even becoming independent of hog lard in both label and content. It was to receive a new impetus in the twentieth century with the development of hydrogenation for the transformation of the oil into shortening.[84]

The American cottonseed oil mills by 1890 numbered 119, were crushing annually a million tons of seed, as compared with 80,000 tons twenty years earlier, and were turning out products of a value of $19,790,000. The seed consumption and the output were to double in the nineties and again in the twentieth century, with nearly three-fourths of the seed crop eventually going to the mills instead of only one-seventh as in 1880. During the eighties the annual export of oil reached over 13,000,000 gallons. The ramifications and integration of the industries based partly or entirely on cottonseed were exemplified by the growth of the American Cotton Oil Trust, which was terminated as a legal "trust" at the end of the eighties. In 1889 this trust owned or included fifty-two crude-oil mills, seven refineries, nineteen ginneries, three compressors, seven fertilizer plants, four soap factories, and four lard manufactories. The capitalization was more than $42,000,000, and the profits for fifteen months were reported as $1,655,784.[85]

The continuation of this story after 1890 would be an expanding statistical account and a listing of the multifarious new uses of cottonseed products. Cottonseed has been a prominent feature in the industrial revolution in the American cotton belt, and the world's leading region in the production of cotton has become the world's leading region in the production of cottonseed oil.

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[84] R. A. Clemens, *By-Products in the Packing Industry* (Chicago, 1927), p. 160, mentions that cottonseed oil at present constitutes about 90 per cent of the raw material of lard substitutes.

[85] Official report of August 31, 1889, summarized in Appleton's *Annual Cyclopaedia* (1889), p. 242.

THE ST. LAWRENCE NAVIGATION AND POWER PROJECT[1]

THE importance of the proposed St. Lawrence development and the standing of the Brookings Institution combine to make this publication one of marked interest and timeliness. Especially is this the case when it is remembered that some years have been spent in the preparation of the work, and therefore the result is the considered and thoughtful opinion of a distinguished institute. Prepared from an unbiased standpoint, as is presumably the case, and having plenty of financial support for the necessary researches, as is undoubtedly the case, the book presents a wealth of factual data for other students, and a clear exposition of the principal factors of the problem. But in setting up the final balance of annual economic gain or loss, the authors fail to include (or exclude) the naturally related items which, in the opinion of the present reviewer, must be correlated if a just and correct picture is to be given.

For convenience, the writer divides his present review into the following: (I) introduction; (II) statement of Dr. Moulton's general argument on navigational enterprise; (III) discussion of Dr. Moulton's argument; (IV) miscellaneous observations on navigational portions of book; (V) power matters.

I. INTRODUCTION

The investigation made by the Brookings Institution has a wide scope. Therefore, in reviewing such an important work, it is desirable that a general or broad consideration be given—one that is not confused by any discussion of irrelevant detail. There is always the danger of losing sight of the woods by examining too

[1] Harold G. Moulton, Charles S. Morgan, Adah L. Lee, *The St. Lawrence Navigation and Power Project* (Washington, Institute of Economics of the Brookings Institution, 1929). In addition to the authors noted above, Professor D. A. MacGibbon, occupying until recently the chair of political economy of the University of Alberta, Mr. E. G. Nourse, of the Institute of Economics, and Mr. F. G. Tryon made special contributions, while Messrs. Sanderson and Porter, engineers, New York, prepared the power Appendix.

closely a few individual trees. Consequently, the present reviewer will try to disclose what he believes to be the outstanding features of the book in their broad aspects only. For this reason practically no mention will be made of a certain number of small items of estimating, of observation, and/or of deduction which seem to the present writer to be sometimes astray. Even if it were possible to refute completely any one of them, the result would not change in any event the broad argument of Dr. Moulton's work. But it is only right to point out that to the present reviewer there seems to be a tendency, when doubtful or uncertain points are considered, to assess them, doubtless unconsciously, a priori against the waterway.

II. MOULTON'S GENERAL ARGUMENT AS REGARDS NAVIGATION PROPOSAL

The broad argument of this book, so far as navigation is concerned, can be stated briefly as follows: After introducing the subject by a brief history and then by an outline of the present status of the proposed waterway, Dr. Moulton describes the project and then discusses the depth of water necessary to achieve success. He reaches the conclusion that not less than 33 feet would be essential to bring about the results hoped for, and predicted by, the active proponents of the waterway. But, owing to other reasons, he closes his argument with a statement that, as first-class liner service would not go up to the lakes in any event, 27 feet is quite satisfactory for the limited use to which the waterway could be put. Then, a valuable discussion is given of present ocean-shipping and of size of vessels. Next, an investigation is made of the navigational cost of the waterway, both in capital and annual charges. The result is, a capital charge of $742,000,000, and annual charges of either $40,000,000 or $36,000,000, depending on whether or not the cost of certain structures under joint usage be charged to navigation or to power. With these figures in hand, Dr. Moulton then analyzes the available traffic, and reaches a conclusion that 10,500,000 short tons is the most that can be expected. The waterway is finally condemned on the following illustration: Assuming a rough

mean of the two annual charges, and taking the total amount of the traffic as estimated by Dr. Moulton, then the annual cost paid by the two countries would be in the order of magnitude $3.50 per ton of freight moved. He next points out that grain constitutes about 60 per cent of the total tonnage, and then, on account of the obvious importance of grain, he transfers to grain the whole argument of economic gain or loss. Thus adjusted, the $3.50 per ton loss already mentioned becomes about 11 cents per bushel of grain. Dr. Moulton has previously stated in the text that the waterway will bring about a saving of 4 cents a bushel on grain. He therefore sums up the argument by saying that the public would be paying 11 cents a bushel in order to save the shippers 4 cents a bushel, obviously a completely unsound economic proposal. From this reasoning in its bald form, Dr. Moulton and his associates condemn the waterway as a navigation project.

III. DISCUSSION OF MOULTON'S ARGUMENT

If the foregoing reasoning is to be convincing, and if the result is to dispose finally of the waterway, then it is essential that the facts shall be as stated, and that the reasoning involved in the assembly of the facts and the deductions to be drawn therefrom shall also be sound. With a view, then, of examining certain of these things, the present reviewer submits some general observations on Dr. Moulton's figures and methods, under the following heads: (1) capital structure; (2) annual charges; (3) amount of probable traffic; (4) balance sheet; (5) a comparison of incomparable figures.

1. *Capital structure.*—The estimated capital cost of the waterway, as deduced by Dr. Moulton, is presented in chapter v, and all estimates are based quite properly on those appearing in the report of the Joint Board of Engineers, 1926. On page 87, Dr. Moulton sets up some Joint Board figures to illustrate the capital cost of the waterway as a navigational enterprise, but in presenting these figures, Dr. Moulton has failed to discuss any other method of distribution of cost as between power and navigation than the one he adopts. A few words must therefore be here inserted to illustrate the fact that the method used by the Joint Board in preparing and presenting their estimates makes it pos-

sible to develop several entirely different methods of effecting such a distribution.

Owing to the nature of the questions submitted by the two governments to the Joint Board of Engineers, the estimates of costs were presented in a number of ways and for varying depths of channel, but in order not to obscure the general argument, the present reviewer proposes to discuss the costs submitted for a 27-foot depth solely. The Joint Board report gave a figure for developing the river solely for navigation, with no expenditure for power purposes at all. The Board also gave another estimate for the cost of developing the river solely for power, with the maintenance of the present 14-foot canals. The Board submitted a further set of figures showing the cost of developing the river for power and navigation as a combined enterprise, and in the latter figures made a separation as between cost of works solely for navigation and solely for power, and jointly for power and navigation. Dr. Moulton has taken as his basis of cost distribution the doctrine or view that the "navigation" cost is the sum of works "solely for navigation" plus half the cost of the "joint works." This distribution is, however, not necessarily just or fair. Indeed, the writer's view is that this method presents the most excessive capital charges that can be built up for "navigation." In order to illustrate this point the writer submits as Table I some capital cost figures previously published,[2] but which nevertheless merit close scrutiny and study, owing to the importance of the whole matter of distribution of capital cost between navigation and power. Doubtless other students would develop other methods of distributing the costs between navigation and power, but the writer feels that there are three general methods or bases of distribution that deserve especial attention. The first basis is the assumption that the cost of navigation in any combined navigation-power development will be not more nor any less than what it would cost to develop the project solely as a navigation enterprise. In this way all the benefits inuring from the combined construction are credited to the power development. The second

[2] See "The St. Lawrence Problem—Some Canadian Economic Aspects" by Lesslie R. Thomson, presented to the annual meeting of the Engineering Institute of Canada, February, 1929, and published in their *Journal*, April, 1929.

basis, or No. 2, can be looked upon as the reverse of the previous reasoning, and under this basis it might well be argued that the cost of navigation is the combined cost less what it would have cost to develop the river solely for power. Here all the benefits inuring from combined construction are credited to navigation. The third basis is the one mentioned by Dr. Moulton, viz., navigation cost, plus 50 per cent of the cost of those works constructed for navigation and power jointly.

In order that the result of these various methods of effecting a distribution between navigation and power may be viewed quickly and their relative magnitudes grasped easily, Table I is given. It will be seen in columns G, H, and J of the table that the estimated capital cost chargeable to navigation in a combined navigation-power project varies from approximately $300,000,000 to $375,000,000, and that the savings effected by building the St. Lawrence Deep Waterway as a combined navigation-power enterprise instead of two separate enterprises amount to about $62,000,000, of which much the greater part is saved in the International Rapids Section.

The especial International Rapids Section development selected by the writer for setting up these figures is that known as the Chrysler's Island two-stage development, designated in the Joint Board Report as No. 5-217. It is the particular development that is now favored by the Canadian section of the Joint Board, and it is the one that the discussions between the two governments seem to foreshadow as the most likely to eventualize. The writer is not hesitant about submitting this table because the figures included are a little higher than those used by Dr. Moulton, who uses the "single stage" figures in the International Rapids Section, as recommended by the American members of the Joint Board. The single stage development would be a little cheaper. Therefore, taking comparable figures, the writer would point out that his figure of about $194,000,000 corresponds to that of Dr. Moulton of $184,000,000, but on looking at the table it is seen that $194,000,000 is the highest of the three bases, and that it might be argued quite strongly that $113,000,000 is the proper charge to navigation for the river section only.

TABLE I*

Showing Estimated Capital Costs of the Whole St. Lawrence Deep Waterway, and Various Distributions of the Capital Cost as between Navigation and Power

(Assumptions and Conditions: General—Two-stage development for Col. B; Specific—Two-stage development (No. 5–217) for Cols. E and J. All navigation 27 ft. Costs are without interest during construction.)

	Estimated Costs, as Given by Joint Board, for Development Solely as a		Estimated Installed Horse-Power	Estimated Cost Of		Decrease, or "Savings" Due to Constructing Work as a Combined Enterprise	Estimated Capital Costs, if Constructed as a Combined Enterprise, Chargeable to St.L.D.W. as a					
							Navigation Project			Power Project		
	Navigation Enterprise	Power Enterprise		Developing Power and Navigation as Separate Enterprises	A Combined Navigation and Power Development		Basis 1†	Basis 2‡	Basis 3§	Basis 1†	Basis 2‡	Basis 3§
	A	B	C	D (A+B)	E	F (D minus E)	G (Same as A)	H (E minus B)	J (Nav.+½ Joint)	K (Same as B)	L (E minus A)	M (Power+½ Joint)
Great Lakes Division:												
Channels between Upper Lakes	$ 54,900,000											
Lock at Sault Ste. Marie	6,500,000											
Compensating Works	3,700,000											
New Welland Ship Canal	115,600,000											
Group total	180,700,000			$180,700,000	$180,700,000		$180,700,000	$180,700,000	$180,700,000			
River Division:												
Thousand Island Section	1,532,000			1,532,000	1,532,000		1,532,000	1,532,000	1,532,000			
International Rapids Section	81,700,000	$235,005,000	2,200,000	316,705,000	270,256,000	$46,449,000	81,700,000	35,251,000	85,056,000	$235,005,000	$188,556,000	$185,200,000
Lake St. Francis Section	1,330,000			1,330,000	1,330,000		1,330,000	1,330,000	1,330,000			
Soulanges Section ||	34,664,000	180,711,000	1,979,700	215,375,000	206,317,000	9,058,000	34,664,000	25,606,000	50,202,000	180,711,000	171,653,000	156,115,000
Lachine Section	55,839,000	129,537,000	923,400	185,376,000	179,052,000	6,324,000	55,839,000	49,515,000	55,839,000	129,537,000	123,213,000	123,213,000
Group total	175,065,000			720,318,000	658,487,000		175,065,000	113,234,000	193,959,000			
Grand total	355,765,000	545,253,000	5,103,100	901,018,000	839,187,000	61,831,000	355,765,000	293,934,000	374,659,000	545,253,000	483,422,000	464,528,000

* Published by courtesy of the Engineering Institute of Canada, Montreal.

† Basis 1: Development solely for "navigation" or solely for "power."

‡ Basis 2: "Navigation" cost is cost of combined development minus cost of "solely-for-power" development, and vice versa.

§ Basis 3: "Navigation" cost is cost of "works primarily for navigation" plus one-half cost of "works jointly for navigation and power," and vice versa. Quoted phrases are from Joint Board estimates. Further discussion of bases will be found in text.

|| The navigation figures given herein for the Soulanges section are developed from the Joint Board estimates and are those that should be compared with the Moulton work, because it was these figures that were available to Dr. Moulton and his colleagues. Subsequent to the preparation of this table and to the appearance of the Moulton book, the Beauharnois Light, Heat & Power Co. started the development of the Soulanges section. The method of construction they propose and the arrangements they have with the Dominion government will reduce the navigational charge in this section by an amount of from $16,000,000 to $18,000,000.

By further observation and study of the original estimate, it is seen that a large divergence of opinion is permissible regarding the primary navigational capital charge. Under these circumstances, it is hardly fair to adopt the highest of the possible distributions with no discussion or indication of the existence of other figures.

Upon reaching this final figure, Dr. Moulton has next applied a figure of 16 per cent for interest during construction. This is most reasonable and perhaps underestimates the amount that should be allowed for such a charge when it is remembered that the waterway will probably be constructed under governmental auspices. Under such circumstances 25 per cent would not have been too much.

Dr. Moulton next proceeds to add a charge of 20 per cent to the combined total in order to allow for the overrunning of the actual expenditure above the estimated expenditure. This allowance is suggested owing to the fact that many large public works in the world have cost more than their original estimates. This is quite true, but, before making deductions from such a fact, it is always necessary to examine the reasons for the observed overrun. In the great majority of cases the estimated costs of public works have been under the actual construction costs, not because of careless or incompetent estimating, but because of large changes in design or plan brought about after the estimates were prepared, but before the actual construction took place. In other words, the construction cost figures would not be comparable with the original estimates. They really refer to entirely different works. One of the best examples of this sort of thing is the comparison frequently made in connection with the construction of the Chippewa plant of the Hydro-Electric Power Commission of Ontario. It has been noised abroad over and over again that the final cost was far more than double the original estimates, but critics who proclaim this fact fail to mention at the same time that the designed capacity of the plant was more than doubled.

Another factor that has raised construction costs of older jobs over their original estimates is the phenomenal rise in price levels between the years 1897 and 1921. If, therefore, price

levels have a real bearing on relation of cost of construction to estimated cost, what about the generally held belief that present price levels will recede during the next two decades? This fact will have an obvious bearing on works estimated now but constructed ten or fifteen years hence. What is the application of these two points to the present St. Lawrence matter?

These two reasons would lead an observer to accept the present Joint Board estimates with a reasonable degree of confidence. Against that confidence may be offset the fact that it has rarely been the fate of public works to be erected exactly as planned. While this indeterminate factor is very difficult to evaluate, the writer does question the validity of throwing in the figure of 20 per cent more or less as a layman's guess, in order to reach an estimated capital figure. Especially is this query or doubt necessary when discussing the present St. Lawrence estimates. The history of these particular estimates must be mentioned. The original Wooten-Bowden report of 1921 made certain estimates for the carrying out of the St. Lawrence Deep Waterway. Soon after these estimates were published a great deal of criticism was directed toward them and uncertainty was raised as to their adequacy. It is obvious that the Joint Board of Engineers, created in 1924, would be familiar with the criticism of the Wooten-Bowden estimates published in 1922. If they had made no change in the estimates, it might reasonably be assumed that they had not studied the matter but had taken the estimates on faith. But the Joint Board changed the original estimates very materially indeed. It is a safe assumption that such changes were not in any sense adventitious or capricious. They would be the result of careful scrutiny and study, and may be assumed to make ample provision for contingencies, etc. Therefore, the existing revised estimates, as presented by the Joint Board, have far more authority than the usual run of estimates. It may be recalled at this point that all Joint Board estimates already contain in themselves an arbitrary allowance of 12½ per cent for contingencies.

It may therefore be assumed that the estimates of the Joint Board are as close to the primary cost of construction as it is pos-

sible to reach at the present time. The writer is under the impression also that the record of the United States army engineers in connection with the relation of estimated cost and real cost has been most enviable. These and other considerations lead most engineers and economists who have studied the problem, if not Dr. Moulton, to the belief that the primary capital estimates are as accurate as it is likely to get them, until designing has gone much farther than at present. A reasonable conclusion is that the estimates have received at the hands of the Joint Board and of their staffs far more consideration than could possibly be given them by any outside body, unless that body undertook to review the whole engineering work itself. The present reviewer does not suppose that the Brookings Institution would claim to have reviewed the whole engineering design. Therefore, summing up the matter, it seems that the allowance of 20 per cent made by Dr. Moulton is a pure "jump" to play safe. But is such a "jump" fair in the present instance? Does it not smack of "loading" the figures?[3]

The next item included by Dr. Moulton as capital is an item of $250,000,000 for ports and harbors on the Great Lakes. It is necessary to submit some discussion as to the soundness of an economic analysis that includes this figure. After pointing out that if a 27-foot waterway be constructed it will be necessary to have harbors of equal depth, Dr. Moulton makes an approximation of $25,000,000 for each of ten harbors in the Lakes. It is perfectly true that the cost of the St. Lawrence Deep Waterway to this continent must include ultimately the cost of the harbors and ports necessary for the proper utilization of the connecting channels. There can be but one opinion on this point, but the writer questions very seriously indeed the economic theory that permits the inclusion of such capital charge without taking cognizance in the subsequent analysis of those benefits that flow to the cities and towns concerned by the creation of those harbor

[3] Another side light on this point can be seen from the following: If it be assumed that the "navigational" capital is the smallest of the three presented, namely, $300,000,000, (see col. H); then 20 per cent on this figure would bring the capital cost to $360,000,000, which the present reviewer has taken as the basis for discussion.

and port facilities. In other words, when a city, such as Duluth, Chicago, or Toledo, desires to have the advantages of a port, it constructs that port with capital derived from various sources, often locally in part, in the belief that the resultant annual local benefits to the city will more than repay the total annual cost of the capital plus maintenance. No port municipality is interested directly in the reduction of freight charges, but it is deeply interested in having business come to its port. But Dr. Moulton in subsequent portions of his book makes no effort whatever to include these local and especial benefits in his ledger account where he balances the total annual waterway charges against the total annual savings and benefits. In other words, in the writer's opinion, there is here a serious error in economic analysis. It seems obvious that, when comparing the annual benefits of the waterway with the annual charges, it would be very much fairer in those cases in which the annual benefits to some local municipality which has created a port are omitted from the reckoning, to omit the capital charge which has created the benefit.

The annual benefits included by Dr. Moulton are solely reductions of freight rates based on his own figure of 4 cents a bushel on grain. Now this 4-cent saving on grain would be attainable or almost attainable with the movement of the present upper lake vessels to tidewater points. The terminal facilities and main harbors, in fact, all the necessary port facilities, are already in existence in the upper lakes. They do not need construction. They can accommodate the movement of the present 20–21 foot vessels. Therefore no capital need be expended on port facilities in order to obtain the savings of 4 cents or about 4 cents a bushel already calculated by Dr. Moulton. Thus, either one of two alternatives must be adopted—if the harbors are capitalized in the project, then the local annual gains from each harbor must be included in the final annual balance sheet. If these local gains are not assessed (it would be most difficult to do so), then the harbor costs should not be included in the capital.

Assuming, then, that no allowance will be given to those annual local benefits that inure to one or more cities which create a harbor, and that the major parts of the traffic savings are calcu-

lated on the movement of the present upper lakers, then a fair estimate of navigational capital to be used in subsequent calculations is:

Primary capital estimate (See cols. G, H, and J of Table I)	$360,000,000
Interest during construction at 16 per cent, about (Assuming correctness of Dr. Moulton's percentage)	57,000,000
Total	$417,000,000
Round figures, say	$425,000,000

This is rather different from Dr. Moulton's comparable but swollen figure of $712,000,000.

2. *Annual charges.*—Coming next to the annual charges on the waterway, Dr. Moulton reaches a figure of $40,000,000. This includes 4 per cent interest and 1 per cent depreciation on the capital set up—$712,000,000—together with about $5,000,000 for maintenance and operation. Dr. Moulton also develops a figure of $36,000,000, if certain capital costs be assumed to be chargeable to power. The effect of these same annual percentages when applied to a reasonable capital charge is seen by observing that the total annual cost on a capitalization of $425,000,000 is:

Interest on capital, 4 per cent (using Dr. Moulton's percentage)	$17,000,000
1 per cent annual depreciation (using Dr. Moulton's percentage)	4,250,000
Maintenance and operation (using Dr. Moulton's estimate figure)	5,000,000
Total annual charges	$29,250,000

This figure is appreciably different from $40,000,000. Consequently, the writer's view is that $30,000,000 is a much nearer figure for the true annual cost of the waterway to this continent than is $40,000,000, provided that, in assessing annual economic loss and gain, no account be taken of local economic return to ports and harbors.

3. *Estimate of probable traffic.*—In chapter vi, Dr. Moulton and his colleagues make an estimate of the available traffic and reach a figure of 10,563,000 short tons. Mention is made of

many of the principal traffic analyses previously made by others, and a critical appreciation of their methods is given in Appendix C. With some of Dr. Moulton's criticisms of previous estimates the present writer is in general accord, and the assembly of the reasoning will be of great benefit to subsequent students of the problem.

But in considering Dr. Moulton's figure of 10,500,000 tons-odd, one is struck by the very small difference between that figure and the figure of actual present traffic moving on the existing 14-foot canals. In 1928, the total traffic on the existing Welland Canal was seven and a half million tons, while the total traffic on the St. Lawrence canals was eight and a half million. We are therefore driven to the conclusion, if Dr. Moulton's figures are correct, that between now and say 1940—the approximate date that might be possible for the completion of the waterway—the only increase to the traffic created by the new deep waterway would be about 2,000,000 tons, a 23 per cent increase in say ten or eleven years.

If the period 1914–19 to 1928 be studied, it is seen that traffic in the St. Lawrence canals (14 foot) increased from about three million tons to eight and a half million tons—an increase of 180 per cent in twelve years, with all the difficulties and handicaps of shallow canals. Does it not seem rather far fetched to suppose that in the period 1928–40, with an increase of depth from 14 feet to 27 feet, there would only be a 23 per cent increase? To submit the question is to answer it—provided no great and benumbing economic depression seizes and holds this continent for perhaps a decade. Therefore, it seems that with normal development it is impossible to believe that with the opening of the waterway the only possible traffic would be 10,500,000 tons.

In pondering this figure, it is well to remember also one or two other estimates and figures. The present traffic on the Sault canals is in the order of magnitude of 90,000,000 tons per annum. It may be pointed out, too, that the International Joint Commission after more than two years' study of the matter estimated a total tonnage of about 48,000,000 tons that would be affected by the creation of the St. Lawrence Waterway. They estimated the

actual movement would be 24,000,000 tons. Messrs. Gregg and Cricher estimated that from 19,000,000 to 24,000,000 long tons would move, while the St. Lawrence Commission of the United States made an estimate of 23,000,000 tons. The present writer has made no study of American traffic that might move, but did make a study of the Canadian traffic and reached the conclusion that about 7,700,000 tons of Canadian traffic would actually use the river section of the waterway. Considering these figures, is not the conclusion justified that Dr. Moulton has tipped the scales, no doubt unconsciously, against the waterway? It must be noted at this point that the amount of total traffic is extremely important because Dr. Moulton has used his estimated figure of 10,500,000 tons as a devisor to reach unit savings—a most unwise proceeding unless the same devisor is used for all comparable data. Another factor related to this point is touched upon in a succeeding paragraph.

4. *Balance sheet.*—Most businesses at the close of a year's operation present to their shareholders a balance sheet for that year, and with the balance sheet draw attention to the comparative figures for the previous few years' operation. The purpose is to enable the owners to appreciate the existing position of their property, and its gains or losses during the year.

This elementary analogy has a distinct bearing on any analysis of the St. Lawrence Deep Waterway proposals. Before any intelligent opinion can be formed of its advisability or otherwise, it seems a sensible proceeding in any supposedly complete investigation to present finally a "balance sheet" showing, on one side, the total annual real cost of the waterway and, on the other, the total annual economic gains to the country, so far as these can be evaluated. The favorable or unfavorable balance thus disclosed would then give some indication at least of the usefulness of the proposed waterway. Such a balance sheet seems to be almost completely absent in Dr. Moulton's book. He presents his estimate of tonnage to move, he presents his estimate of the annual cost, he presents his values for fixed charges, etc., but at no place does he state clearly the decrease in the cost of moving such tonnage (freight savings) except in the case of grain. No sepa-

rate savings are calculated, commodity by commodity. Also, while the book freely admits that certain farmers in the interior will receive, because of the waterway, a slightly higher price on their grain, whether shipped over the waterway or not, no effort is made to include such a factor in the final comparison. If chapter xi, the summary, be looked upon as the equivalent of a balance sheet, the statements submitted in that chapter are in no case complete. Dr. Moulton mentions 4 cents savings on grain, and compares this with the cost to the country in annual charges, etc., of moving 10,500,000 tons over the waterway. The obvious conclusion from this balance sheet is that the proposal is preposterous, but a comparison of these figures does not in any way present a fair or complete balance sheet of the St. Lawrence Deep Waterway. No mention is made of the savings that the waterway might bring about in the handling of the other commodities listed on page 109. The present reviewer has already called attention to the basic economic fallacy of including the cost of the harbors in the annual charges without at the same time including the annual benefits that will inure to the cities creating those harbors. Therefore, to sum up this point, the present reviewer feels that a very distinct loss to the book has been caused by the failure of the authors to set up and include a proper balance sheet.

5. *A comparison of incomparable figures.*—Before closing this criticism of Dr. Moulton's argument, it may be not out of place to call attention to two comparisons he makes of figures that are, strictly speaking, not comparable.

Assuming, for the moment, the propriety of including the cost of harbors in the capital set-up of the waterway, the annual charges amounting to $36,000,000 or $40,000,000 are reasonably exact figures. The order of magnitude of the contained error cannot be very large. In other words, under those special assumptions, the figure of $36,000,000 is correct, plus or minus perhaps 15 per cent. Similarly, in the writer's opinion, the figure of 4 cents a bushel is about correct, with a possible error of perhaps plus or minus 25 per cent. Coming, however, to the figures of 10,500,000 tons traffic, we are dealing with a quantity, which, if too high, cannot be too high by more than say 20 per cent or 25 per cent.

But if it be too low, the error may be as much as 150 per cent or even 200 per cent. While there is no objection to the academic exercise of dividing one figure into the other, there is a very great economic objection to utilizing the figure so derived as if it had equal weight or comparability with the figure of 4 cents a bushel saving. The writer believes that when such really incomparable comparisons are made the possible fallacy should be pointed out. If, for example, Dr. Moulton's estimate of traffic were wrong, perhaps half of what the traffic ultimately would be, then his cost-to-the-country figure would be $1.75 per ton, or 5½ cents per bushel instead of 11 cents. This figure of 5½ cents would then be comparable with Dr. Moulton's figure of 4 cents. They would thus be not so far apart, even though the 5½ cents figure is "loaded" with the annual charges of the ten harbors (capital $250,000,000).

Another distinctly peculiar comparison occurs in the chapter on traffic congestion. Here the authors are trying to determine whether any justification can be made for the St. Lawrence Deep Waterway as a relief to the general rail congestion that is said to exist by some proponents of the waterway. In assessing such a problem, the authors quite properly set out to inquire whether a double track railway would be more efficient. In this inquiry they reach the startling conclusion that "the three railways [i.e., between Boston and Chicago] that could be constructed for the cost of the waterway would have a combined capacity approximately 30 times that of the water route."

This statement is so extraordinary that the reasoning and figuring that lie behind it need careful analysis. Dr. Moulton first determines the theoretical maximum capacity of the waterway as 42,000,000 tons a year. This is apparently based on one-way traffic. It makes no allowance for ships in opposite directions waiting to enter a lock alternately, which situation would increase materially the ratio of one lockage of 9,000 tons per hour. The season, too, is taken on the short side. However, the result is, as Dr. Moulton points out, an interesting and useful theoretical figure.

The corresponding railway figure is next developed, and the result is 420,000,000 tons per annum on a double-track railway.

Taking traffic in two directions subject to the purely theoretical conditions outlined by Dr. Moulton—trains of fifty cars of 40 net tons moving at 20 miles per hour, at five-minute intervals in both directions, with terminal and divisional points capable of handling such a unique density of traffic—this figure of 420,000,000 tons per year is a possible though purely theoretical figure.

When, however, Dr. Moulton attempts to compare the money equivalents of these two different traffic movements he breaks new ground. The Moulton figures of the deep waterway are:

Waterway:

Capital: $742,000,000 (including cost of ten terminals but no equipment—ships).

Annual maintenance of waterway and fixed charges: $40,000,000.

Maximum tonnage capacity: 42,000,000 tons.[4]

The figures for Dr. Moulton's theoretical railway then follow:

Railway:

Capital cost: $250,000,000, including terminals, rolling stock, and equipment as clearly specified by Dr. Moulton; see p. 180.

Maintenance of way and fixed charges: $20,000,000, specifically stated by Dr. Moulton to be comparable to the $40,000,000 figure; see p. 177.

Maximum tonnage capacity: 420,000,000 tons.

These railway figures are so far from the mark as to be almost ridiculous if the railway is to handle the traffic demanded by Dr. Moulton. Let the capital figure be first examined. Two new railway terminals adequate for such unprecedented traffic, if newly constructed today in such cities as Boston and Chicago, would cost colossal amounts not estimatable without preliminary designing. The magnitude of these amounts can certainly not be estimated on any mileage basis, as Dr. Moulton has done. Terminals at one or more intermediate cities, if traffic were to be got from them, would be necessary and would add substantially to the capital charge. The railway itself, right of way, double

[4] When comparing 42 with 420 millions, it is necessary to remember that the 42 million capacity takes no account whatever of the tremendous tonnage that can move freely through those portions of the Great Lakes system where no locks occur, e.g., Chicago to Buffalo. The cost of these improvements is included in the capital set-up.

track, sidings, stations, signals, and other operating facilities would cost in that region well over $100,000 a mile, while the equipment theoretically necessary to handle the heavy density of such traffic would cost not less than $500,000,000. Actually it would cost more. One calculation alone will justify the reasonableness of this last figure: With trains of fifty cars of 40 net tons each at five-minute intervals, the traffic would require, on a running time of 20 m.p.h., about 1,200 trains on the road at any one instant. Making allowances, also, for a two days' turnaround time at each end terminal, the total number of trains required would be about 2,350 trains of cars. This equals about 120,000 cars with no allowance whatever for cars out of service, nor for cabooses. At perhaps $2,500 per car, the cost equals $300,000,000, or at $2,000 equals $240,000,000. This is solely for freight cars in service. Summing up these various figures, it may be stated confidently that the total capital cost of Dr. Moulton's railway, including rolling stock (as insisted upon by Dr. Moulton) would be in the order of magnitude of $1,000,000,000. But in spite of this, Dr. Moulton states that the railway could be built, including cost of right of way, bridges, stations, sidings, signals, terminals, road locomotives, freight cars, and switching locomotives, for less than the apparent cost of the railway freight cars alone. No comment is here needed.

Having now pointed out that the capital cost would certainly be four times the amount estimated by Dr. Moulton, it is hardly necessary to point out that his annual figure of $20,000,000 for fixed charges and maintenance of way is even further astray, because in estimating his maintenance of way, etc., he entirely overlooked the tremendous difference between effect on roadbed of present traffic densities on Class 1 railways and the effect on roadbed of the traffic density of the railway he is describing. Therefore an allowance in the ratio of 20:16 is far too low. The maintenance of way on a railway is of two kinds—fixed and variable. The large modern railways investigate closely the cost of this variable maintenance of way[5] per gross ton mile moving.

[5] Similarly car maintenance will be extraordinarily heavy on this railway, beyond anything yet experienced in American railways. Again locomotive maintenance will be large. But the latter are comparable to the maintenance of ships and need not be included in the calculation.

When the results of such investigations are applied to the gross ton miles of Dr. Moulton's double-track railway, the first thing that strikes the student is the physical impossibility of carrying out so much maintenance with such a density of traffic moving. Rails, for example, could not be renewed nor could other track work be done with fifty-car trains passing each way every five minutes throughout the twenty-four hours. It would require four tracks even as a theoretical minimum, with a consequent increase of capital and fixed charges. The next thought is the impossibility of estimating even approximately the maintenance-of-way charges with such an extraordinary and unprecedented density of comparatively high-speed freight traffic. Therefore, nothing is gained by submitting in this review maintenance figures that cannot be better than intelligent guesses. But there can be no shadow of doubt that the sum of the fixed charges on the capital and the maintenance-of-way charges on the railway when carrying 420,000,000 tons per annum would be many times the ridiculously low figure of $20,000,000 already quoted by Dr. Moulton.

If these views are somewhat near the mark, then the comparable railway would involve, if moving 420,000,000 tons per annum:

Capital cost: order of magnitude of $1,000,000,000.

Maintenance of way and fixed charges: Not definitely estimatable but many times $20,000,000 (no allowance for car maintenance or locomotive maintenance).

Tonnage, maximum capacity: 420,000,000 (but four tracks would be necessary even theoretically for such a density of traffic).

These figures may be compared with the waterway figures of $712,000,000, $40,000,000, and 42,000,000 tons. When the word "compared" is here used, the writer does not wish to imply that they are really comparable from an economic point of view. They are not comparable and cannot be compared, owing to the inherent differences in the quality of the two transportation mechanisms. But the figures in this review present a less erroneous comparison than the figures quoted by Dr. Moulton. In the writer's judgment the figures submitted by Dr. Moulton are basically not comparable, and are therefore quite misleading.

IV. MISCELLANEOUS OBSERVATIONS—NAVIGATIONAL PROJECT

Chapter iii is a very detailed analysis of the depth of channel required. The conclusions of this chapter are based on the assumption that vessels would have to draw 2 feet 6 inches less than the depth of the channel provided. This statement is quite acceptable and reasonable for vessels operating at their full or nearly full speed in continuous artificial channels, e.g., a dredged river section stretching continuously for long distances. But it is not necessarily true for lake vessels operating on a route composed of open inland seas and short connecting artificial channels where the shallow restrictions occur only at certain successive points in a total voyage 1,200 miles long. Indeed, the present lake vessels often determine their loading so that the difference between depth of channel and the draft of vessel is only a matter of inches, in order to bring about the maximum economic return to the carrier. Consequently, the analysis of the various depths of channels, as presented by Dr. Moulton, needs, in the opinion of the writer, certain adjustments for these widely divergent usages. As supporting the present writer's view, he would refer to Dr. Sadler's discussion on Mr. Shenahon's paper appearing in the *Transactions of the American Society of Civil Engineers* (1926), LXXXIX, 525, in which Dr. Sadler states "on the Great Lakes the vessels operate through the shallower channels, not with some feet of clearance, but more often with inches, and do so successfully."

If this be true, then the conclusions noted on page 60 of Dr. Moulton's book are not strictly accurate. Therefore, "a 27-foot channel would limit navigation to local coastwise vessels and the smaller and relatively inefficient ocean freighters" is not a completely fair statement, if with a 27-foot channel a boat could load to 26 feet for passage at the critical points only. Nearly all students, including Dr. Moulton, are agreed that at present first-class liners would not make use of the proposed deep waterway to the lakes. Therefore, the arguments about a 30-foot or 33-foot channel, while most interesting, are premature until such time as economic conditions in the interior of the continent will demand a liner service. The real merit of the waterway, if any,

rests on the assumption that the larger upper lakers will move in continuous voyages to tidewater at some point, and that in addition there may be perhaps a certain movement of tramps into the Great Lakes.

Chapter vii is devoted to an analysis of the St. Lawrence Waterway and agricultural traffic, and has been written by Mr. Edwin G. Nourse, well known as an agricultural economist. It is a valuable chapter clearly written, and presents conclusions that seem on the whole to be fair and reasonable, though the present reviewer feels that in certain instances Mr. Nourse has been unduly conservative and pessimistic in some of his estimates. On the other hand, the writer is in thorough accord with his estimates of a Canadian grain movement of about 4,360,000 tons. The writer's own estimate in a previous article on this subject[8] reached a figure of 4,250,000 tons. In that section of the chapter dealing with the probable reduction in freight rates, the writer is in general accord with what Mr. Nourse says, though he believes that the final figure of 4 cents per bushel is a little optimistic. In general, the present reviewer is in accord also with Mr. Nourse when discussing the indirect benefits, with the exception of the statement that "it should also be pointed out that the indirect gains to the farmers in the producing areas, who would be benefited by the St. Lawrence route, would to some extent be at the expense of other groups in Canada and the United States respectively." The writer feels that it would be a truer way of expressing this point by stating that while some of the benefit of cheaper transportation would undoubtedly inure to consumers in Europe, the incidence of the balance of the benefit on various parts of this continent would probably be restricted to the Middle West regions. In other words, because the wheat producer in Saskatchewan, for example, would benefit by say 3 cents a bushel due to the opening of the St. Lawrence Deep Waterway, it does not necessarily follow that the smaller wheat producer in the eastern townships or Ontario would be adversely affected. It must be clearly understood that this saving of 3 cents is a transportation

[8] "The St. Lawrence Problem—Some Canadian Economic Aspects" by Lesslie R. Thompson, *loc. cit.*

saving between the point of origin and the seaboard. Consequently, it is fair to assume that Montreal prices will not be unduly affected, or, rather, the only loss the general eastern producer of wheat would suffer is roughly the amount by which the European price is lowered.

Probably the most valuable part of the navigational section of the book is the very complete analyses of traffic possibilities, which appear in Appendixes D to J, inclusive. The present reviewer feels that the result is too low, but wishes to express a word of sincere appreciation of the effort to get at the traffic facts. This will be of great assistance indeed to other students of the problem.

In closing these miscellaneous remarks, the writer would like to point out one very important omission in the book—at least from the point of view of other serious students of the problem. There is no bibliography included, and its absence throws an unnecessary amount of wasted effort on the part of those who will in the future be attacking the problem.

V. POWER

When Dr. Moulton and his coauthors come to chapter x, dealing with the power aspects, the work is evidently based on the able Appendix K, prepared by Messrs. Sanderson and Porter, engineers, New York and Chicago. As this present review of the book is perhaps reaching undue length and as technical discussions of power by engineers are not likely to be of marked interest to general readers, the writer will not therefore make any attempt to review in detail this chapter dealing with power and the Appendix. The gist of the finding is that so far as the United States' share of the International Rapids Section power is concerned, it would not be economically justifiable to develop it immediately for transmission to the metropolitan district of New York or to New England. The authors find also that the possible establishment of electro-chemical or electro-metallurgical works located at the power sites might, however, warrant the early development of the power. No one informed of the facts would dispute the latter statement, and so far as the former finding is concerned,

the present reviewer would point out that there has been a considerable anxiety displayed by various companies to obtain these power rights both in Canada and in the United States. Further, the development of the Soulanges section of the St. Lawrence River for power by the Beauharnois Power Company, which work was actually started after the appearance of Dr. Moulton's book, was not in any way deterred or stopped by his finding.

The writer cannot close this very brief mention of the power section of the book without expressing a word of very sincere appreciation of the value of the study made by Messrs. Sanderson and Porter. It will be of real assistance to all subsequent students of the problem, irrespective of whether they agree or disagree with the methods and figures used by these well-known engineers.

LESSLIE R. THOMSON

MONTREAL, CANADA

BOOK REVIEWS

The Economics of Farm Relief. By EDWIN R. A. SELIGMAN. New York: Columbia University Press, 1929. Pp. xv+303. $3.00.

Here is a new departure in applied economics. A candidate for president of the United States wants an economic analysis of a great political issue. He has as chairman of his campaign committee a prominent business executive who a year before had turned to a professional economist to analyze for him and his business associates a crucial issue with reference to their commercial future. The business executive had found the work of this economist of such practical value that he suggested that the same man be asked to perform a similar service for the political candidate and his party.

Now this particular economist was not an agricultural economist. Thus he had not come to see the whole agricultural problem from the angle of farm management, marketing, land economics, or other particular functional specialization, nor had he absorbed a geographic provincialism as a result of laboring on the problems of a particular region. Along with the freedom from bias which this might give, there went of course also a lack of any intimate knowledge of the complex technical details of modern agriculture with the great diversity which it presents in the United States, and of the whole social and cultural nexus in which it has its setting. Finally, however, this investigator had long ago shown himself acutely aware of the importance of broad factual foundations for such a study and possessed a flair for organizing a staff of assistants through whom a great mass of data could be gathered and sifted.

In the short space of ten weeks, Professor Seligman assembled and culled through an astonishingly large part of the results of the work of the agricultural economists and their allied specialists during the last twenty-five years or more. It is of interest to all of us to see which parts of the work he finds valuable and which considerations or hypotheses of the workers have in his opinion been well considered. Fortunately he has not refrained from directing kindly but pointed criticism at views which seem to him not to run with the general trend of the best-established economic thought.

This much for Professor Seligman's general approach to his task. To it we should add his long-established and well-known reputation for clear and easy exposition of even a difficult theme. Together they produce a co-ordinated, not-too-long conspectus of the whole problem of farm relief which might be read with profit by many thousands of our fellow-citizens. This is particularly true of the earlier part of the book which, in the judgment of the reviewer, presents the historical background of the problem and opens up and organizes the complicated elements of the present situation in a quite admirable way.

The latter part of the book seems to me less impressive. In it Professor Seligman is revealed in the attractive light of an economic liberal, refusing to be bound by the traditions of a laissez faire past. He is anxious to see something of a positive and constructive nature done to meet a practical situation in which certain individuals have fared unhappily. Whoever may be responsible for the institutional situation in which this has come about, the good citizen, the constructive economist, the political party, or administration which expects to justify itself must accept a definite responsibility for improving these conditions in the future.

Professor Seligman gives a very sensible account of what the individual may do and indeed is doing toward the amelioration of his lot. He sketches with fair understanding the achievements of voluntary group action after the co-operative pattern. He sets out forcibly the inadequacy of both these lines of effort as anything like a comprehensive solution of the problem. He turns then to a discussion of "the display of national power" in a program of farm relief. After noting the incidental benefit that agriculture would derive from international action to prevent war and any effective steps toward the stabilization of general prices, he turns to four functions of the federal government which might minister to farm relief. These are called, respectively, regulation, equalization, education, and price modification. The first three are dealt with in very general terms, the discussion at places running pretty thin or the suggestions being subject to open challenge. This is the inevitable result of the author's second-hand contact with the field and is one of the drawbacks of the multiplicity of counselors which in other ways served him so well.

The real dénouement of the book of course comes in the discussion of governmental price modification as developed in chapter vi. It recommends a federal farm board, though not precisely the kind of farm board which the special session of Congress called by the new Republican administration has just given birth to. Professor Seligman's farm

board would have both major and minor functions, the former being (1) the securing of the needed readjustments in credit, taxation, and the tariff; (2) the establishing of model farms and model farm communities; and (3) the undertaking of a better classification of land. Of these, I would suggest that (3) is really comprehended under the problem of submarginal land embraced under the major function to be discussed in a moment, (2) is futile, and (1), restated in terms of agricultural policy as a whole, might well be made the central focus of federal farm board activity, although entirely omitted from the present farm board law, which is simply another "Agricultural Marketing Act."

The major functions of the farm board would consist in the endeavor to exert some influence on the more basic price factors. Making a distinction between price fixing, price control, and price influencing, we found that the four possible functions of a farm board comprise the elimination of uncertainty, the treatment of the submarginal lands, the reduction of fluctuations, and the control or elevation of price.

The elimination of uncertainty is to be accomplished through a wide extension of the insurance principle. This is to be "calamity insurance" and not price insurance, private and mutual concerns to handle the initial underwriting, with the government standing back of them as a great reinsurance agency. This seems a very fruitful suggestion, although it might have been amplified by some analysis of the possible necessity of using compulsion to bring within its scope a sufficiently large number of those enterprises intermittently subjected to the several hazards and, on the other hand, a consideration of the possible danger of including within its ministrations areas in which the risk is so chronic as to render them so inferior as to be submarginal. The latter would have been particularly fitting in view of the fact that the following section deals with "the decrease of submarginal production" as the second division of the board's price-modifying function.

With reference to the handling of submarginal lands, the matter is oversimplified by a virtual limitation to the recommendation for the purchase of very cheap areas for reforestation without consideration of other less easily acquired areas and of the degree and kind of compulsion or restraint which might be necessary to curtail the use of old areas and to prevent the opening up of new areas of similar kind. Social control in agriculture is so fast becoming a vital issue that it would seem well to face its issues fearlessly at whatever point we may encounter them. It may be suggested also that Professor Seligman's recommendation concerning submarginal lands is compromised by a

very tiny slip. Submarginal lands suitable for reforestation, he says, "are now available for purchase at comparatively low figures and the funds obtained by the owners would enable them to buy farms in the better regions." The whole trend of the analysis makes it obvious that Professor Seligman is quite aware that transferring farmers from less productive to more productive lands will not help to solve the surplus problem. It is, however, unfortunate that he did not phrase the latter half of this sentence differently. Concerning submarginal lands in general, Professor Seligman thinks it feasible for the government to purchase and reforest a sufficient area to "exert a perceptible influence on agricultural prices."

As for intra-seasonal stabilization, "the chief activity of a farm board must be devoted to securing a more equable fitting of the supply to the market throughout the season, which can be accomplished only by controlling, through the proper organizations or corporations, each respective crop as a whole." If we go beyond these shorter time fluctuations, however, "the attempt to raise the domestic over the export price level would involve a huge and difficult experiment and the farm board will therefore do well . . . . to reserve its endeavor to deal with the export surplus through the agency of the tariff to periods when an especially great depression of prices may be expected." This with reference to wheat. As for other stable products, "it would be still more complicated to deal separately with the export surplus and even more advisable to proceed with circumspection and moderation."

In his final paragraph, Professor Seligman wisely characterizes the whole problem as in large part one of readjustment. In the long run forces will work themselves to an equilibrium of their own, but a better equilibrium, or one more promptly attained or secured at less social cost, could, in his judgment, be brought about by the positive action of government. Oddly enough, however, the closing sentence reaffirms as the great objective of this effort the preservation of "the old-time American farmer." To the reviewer, this seems to miss the whole point of the matter. The problem *is* one of adjustment and one in which government *can* perform certain rather definite services, but these should be directed toward facilitating the better economic and social fitting of a *new-time* American farmer, more prosperous and happy, into a world of changed technique and altered commercial relations.

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The Consumption of Wealth. By ELIZABETH ELLIS HOYT. New York: Macmillan Co., 1928. Pp. v+344.

The consumption of wealth, as Professor Taussig once said, is "an uncertain group of topics." Miss Hoyt applies herself in the main to the discussion of two questions, Why are our consumption habits what they are, and how can we control them for our welfare?

Using the term interests in preference to wants to refer to economic choices, her thesis is that our interests are culture-traits and culture-products. To understand them, therefore, we must know first what types of interests are common to all cultures, and, in the second place, why one group develops its culture in one direction and another in another. The first question raises a psychological problem, the relationship between human nature and the interests that are found everywhere. The second involves an examination of the relationship between culture-traits and the physical environment, race, methods of communication, and economic arrangements. Data here must be drawn from cultural anthropology and comparative studies of standards of living. The culture-idea, Miss Hoyt says, determines what a people considers worth while to consume. She devotes one chapter to illustrations drawn from six cultures, the primitive, the Egyptian, the East Indian, the Greek, the Chinese, and our own.

But how is the consumer to determine the validity of his accepted standard of living, to evaluate his answer to the question, what is worth while to consume? Miss Hoyt points out the scope and limitations of our scientific knowledge. After it has done "the utmost it is now capable of doing and indeed the utmost we can forecast for it at present it will have answered less than half the questions we should like to have answered for directing our consumption." We are thrown back then to a consideration of consumption as an art and the guidance we can get from the "best thought of the world" as to the good life, the happy life, the balanced life, and so forth.

What has Miss Hoyt achieved? Not a complete explanation of our consumption choices, not a manual for those who want to know what is best for them to consume. What her book offers to the student is a guide to a fruitful field for investigation, and to the consumer pages of rare discernment, obviously the product of thought and scholarship, written with literary skill and grace.

HAZEL KYRK

UNIVERSITY OF CHICAGO

The Economics of Consumption. By WARREN C. WAITE. New York: McGraw Hill Book Co., 1928. Pp. vii+263. $3.00.

The method of approach in this outline of the study of the utilization of wealth is economic, contrasting with the sociological approach of Dr. Elizabeth Hoyt's *The Consumption of Wealth* (1928) in which the approach is sociological. Dr. Waite also takes for granted a background of economic theory, while Dr. Hoyt seems to assume no previous study.

The Economics of Consumption is intensive and clean-cut and marks an advance in the scientific study of consumption as a phase of economics. The plan of the book comprises an introductory chapter and four parts, entitled, respectively, "The System of Prices and the Consumer," "The Choice of Goods," "Administration of the Individual Income," and "Social Problems of Consumption." Though the approach is economic, Professor Waite does not ignore the social implications of consumption. In Part II, "The Choice of Goods," which makes about a third of the book, he discusses the psychological basis of consumers' choices but devotes most of his attention to the effect of price. In relation to consumers' purchasing habits he discusses retailing and its costs, the increasing efforts spent in distribution, and the possibilities of reducing the costs of retailing, leaving to the psychologists and sociologists the deeper analysis of choice.

The work of the social investigators of family expenditures is considered, beginning with the early studies of Sir William Petty in 1672 and including the French study by Frederic LePlay, 1855–79, the German study of Ernest Engel in 1857, and the various American studies, such as those of Chapin, the United States Bureau of Labor, More, Ogburn, the California State Civil Service Commission, and the United States Department of Agriculture. In criticism of these writers, Dr. Waite says:

> It is unfortunate that the majority of investigators of family expenditures have not seen fit to carry their analysis beyond the state of arithmetic averages. It would be useful, for example, if the data for the various income levels were given in terms of frequency distributions and coefficients of variation for each budget group. We would then be able to judge the consistency of expenditure on the different levels, and gain other useful information.

He points out that "when we endeavor to examine the changes taking place within these large budget items accompanying income changes

we have very inadequate data. We have no data for the United States from actual budgets showing the effect of larger incomes on the proportionate expenditures for different sorts of food." Regarding expenditures for clothing, however, he deduces from the Bureau of Labor study that the steadily increasing proportion is "partly due to the fact that the higher income groups contain larger families. The increase seems to come largely from the increased expenditures of the older children rather than of the parents or of the younger children" (p. 111). Throughout the book the author stresses the need for research in the working out of criteria for consumption and for more data on details of expenditure, according to a well-co-ordinated plan in different areas and on different income levels.

In his discussion of consumers' co-operation, Dr. Waite makes clear how important the movement is to any significant advance in consumer technique, and how far behind various European nations in this respect American consumers fall. The book attempts to make no contribution, however, to that subject. The discussion of national problems of consumption falls disappointingly short of adequacy, embracing only some interesting comments on the most effective level of consumption for a nation, and on the modification of consumption by government expenditure. Government may, for example, "provide consumers with certain services, or it may prohibit the consumption of certain articles, or it may modify consumption by affecting the relative prices of goods . . . . through . . . . taxation."

Some of Professsor Waite's general opinions are of significance. Consumer protection should, he thinks, be carried much farther, especially in the working out of standards. "There is need for an organization or government department that will seriously devote itself to this task. . . . . Specific goods should be tested . . . . and the findings published." He recommends also further reduction in the varieties of goods which the consumer purchases, referring to an estimate by the Chamber of Commerce of the United States that one-quarter of all industrial effort is wasted because of irrelevant overdiversification of styles, types, and sizes.

The problems at the end of the chapters do not seem particularly stimulating or suggestive. No bibliography has been included, but footnotes furnish a guide to the sparse literature on the subject. Another omission is that of credit unions in the discussion of savings and sources of credit for consumption (p. 183). The book introduces no new material, but provides a systematic, concise, lucid, and readable compilation of the scattered thought and material on the subject, and

points the way to further effort which must be expended by economists before the economics of consumption can have the place in economic science which its vital importance justifies.

FLORENCE A. ARMSTRONG

SIMPSON COLLEGE

Economics of Fashion. By PAUL H. NYSTROM. New York: Ronald Press Co., 1928. Pp. vi+521.

Many students of economics and business were given their first brief but interesting view of what lies behind fashion by Cherington's little volume on the wool industry, published in 1916. Those whose interest was awakened by that glimpse will get no small satisfaction from this volume on *Economics of Fashion*. In the Preface to this extremely interesting book, Professor Nystrom declares it his purpose to "present a well considered statement of information and suggestion concerning: (1) what fashion is and how it operates; (2) what the causes of fashion are and what factors influence its movements; (3) what the present fashions are; (4) the current trends of fashion and coming fashions." To the discussion of each of these matters the author brings a quantity of material from bibliographical investigation, from practical experience, and from long association with purveyors of fashion merchandise, which renders the book a significant and enjoyable contribution for both the business man and the student of society.

Although not formally so organized, the volume has in reality four parts. The first eight chapters are concerned with the nature of fashion and the cultural forces which mold it or are closely related to it. Chapters ix to xi might well be called "The Institutional Machinery for Fashion Creation." A third part is "A History of Modern Fashion," particularly in clothing, while a final division deals with technical advance in the production of fashion goods and modern trends in fashion.

A glance at these main themes will at once lead some readers to the conclusion that the book is named *Economics of Fashion* with doubtful accuracy. The discussion of "Fashion Cycles" in chapter ii, couched in statistical terms and fortified with graphic presentation of quantitative data, is without doubt an addition to what we commonly call the economics of consumption. But when in the next several chapters the author plunges boldly into "The Psychology of Fashion," "Factors that Influence Fashion Movements," "The Relation of Art

to Fashion," "The Influence of Custom on Consumption," and "Utility in Relation to Fashion" he is invading territory which many economists have deliberately declared to be foreign to their interests and subject to exploitation only by others. A similar observation will be made concerning that section which deals with the institutions of "The Fashion World." The Haute Couture of Paris is not an impersonal device through which the blind forces which mold fashion automatically blend in consummation. It is organized as a creative agency. Its purpose is to determine what people can be made to desire. So, too, Paquin, Poiret, Lanvin, Lelong, Chanel, Lucille, and Patou are creators of fashions and thus of value in an important form of consumption.

The book is indeed an anthropological study quite as much as it is an economic one in the narrow sense of the word. To the reviewer this is a merit for purposes of the economist. Such attempts to go behind subjective values as they may express themselves in buying and selling and to explain the influences, the personalities, and the machinery which bring them about must improve our insight regarding the nature of production and exchange, as well as consumption. For the latter field it is particularly important. Such presentations go far in clarifying our thinking about the nature of human wants. One cannot read this book without being impressed with our nearness to our simple brown and black brothers of whom the anthropologists write so extensively. Nor can he fail to wonder at the limitations of the human race in finding consumption possibilities, once bellies are full and normal temperature conserved, or to remark the curiously primitive ways in which we find it repeatedly desirable to add interest and variety and "kick" to life.

As to the certainty with which the author writes in several chapters one must be dubious. Neither Professor Nystrom nor any other person is expert in all the matters which are considered. Regarding the relation of art to fashion, for example, one feels sure that the author is using a second-hand knowledge of art with a first-hand knowledge of what fashions have been, and that the chapter is interestingly illustrative rather than definitive. So, also, in dealing with the influence of custom on consumption: most of the ideas are far from new to a reader of Tarde or of any of many anthropologists. Professor Nystrom's major contribution is in bringing into an organized design the variety of forces surrounding and controlling a single important manifestation of human action in consumption. In addition he has constructed certain elements of this design from what have heretofore

been scattered and fugitive fragments. The book is replete with charts, tables, and illustrations which add to its clarity and interest.

LEVERETT S. LYON

THE BROOKINGS INSTITUTION

Making Goods and Making Money. By HORACE TAYLOR. New York: Macmillan Co., 1928. Pp. x+296.

The catchy title which Professor Taylor has chosen is in character with his book. His appeal is to the educated general reader rather than to the technical specialist. And while no one objects to a book having style, the critical specialist reader of this volume is likely to be at points a bit unpleasantly aware of the author's endeavor to be picturesque.

The starting-point of the argument is the opposition of view between Veblen and Adam Smith, on the question of economic harmony. After two introductory chapters defining the problem and one devoted to a historical sketch of American industrial development, the body of the book discusses as regards manufacturing industry in America the question which way the "frontier of conflict" between making goods and making money has been and is moving. Four chapters take up in their bearings on this question, respectively, "The Growth in Size and Scope of Industrial Units," "Internal Industrial Efficiency," "External Relationships of Manufacturing Enterprises," and "Decreasing Costs." The argument throughout is that the movement of the frontier is in the direction of increasing harmony, that it is progressively more the case that industry makes more money by making more goods. The final chapter, entitled, "For Better or for Worse," is in part a recapitulation and in larger part a "survey of a very few of the questions of social policy" following a warning statement that the processes earlier described "do not constitute progress" but that whether they are for good or evil "depends on whether we see clearly the problems and the possibilities in the change process and adopt intelligent attitudes and policies in regard to them."

At several points Professor Taylor's reasoning is not too clear. The questions of policy barely and tardily mentioned include the distribution of wealth, the wisdom of consumers' choices, trend of cost of merchandising functions, the meaning of economic production, relation of wealth to welfare, value of leisure as compared with products, international trade policies and "imperialism," education, consumers' co-operation, and even the famous paradox of scarcity and exchange value versus abundance and utility. It is not apparent why these are

viewed as problems of policy in contrast with the elements or aspects of the economic process discussed in earlier chapters. Moreover, what would appear to be the two most important specific problems in connection with the coincidence or conflict between making goods and making money are still missing on the last page. The first, it goes without saying, is monopoly. This is mentioned several times, but there is no discussion of monopoly as a source of disharmony or facing of the problem as to how much monopoly exists or the amount of money made by monopolistic restriction of output. The implication, or practically plain assertion, is that action to prevent monopoly itself reduces production (pp. 195; 233, n. 3). The other consideration, to which not the least reference is made, is the possibility of disharmony through differences in the shape of the cost curves in different industries, pointed out by Marshall and elaborated by Pigou.

Moreover, Professor Taylor's main argument is hardly conclusive. The fact that business has been making more goods, or even increasing in technical efficiency, does not meet Veblen's point at all. Veblen himself would of course attribute this to the "engineer," leaving the business man in the strict sense still in the negative rôle. To prove any real recession of the frontier of conflict, it would seem to be necessary to show that business has made a progressively better utilization of the available technological system, that it has come nearer to realizing its possibilities in view of the economic situation at a given time. The real problem is one not of actual volume of products, or even volume from given resources in labor and other factors, but of a *ratio* between what is achieved and what might reasonably be expected. Professor Taylor has overlooked this essential aspect of the problem, and by dealing with a "dynamic" issue in "static" terms has fallen into a non sequitur.

Thus, in matter as in style, the book is on the level of semiscientific, semipopular argumentation. It does not pretend to be strictly scientific in either of the two possible senses, either rigorous deduction from general principles or exhaustive inductive proof from facts. This is not necessarily an objection to it, as there is undoubtedly a need for exposition on this level. Indeed, it is probably about right for the people who ever were seriously bothered by the conflict between the pronunciamentos of advocates of "individual liberty" and those of Veblen and his cohorts. And the book contains much interesting factual material as well as the "romance" of American industry.

F. H. KNIGHT

UNIVERSITY OF CHICAGO

Margins, Expenses and Profits in Retail Hardware Stores. By HORACE SECRIST and J. A. FOLSE. Chicago: A. W. Shaw Co., 1928. Pp. v+174.

Horace Secrist and J. A. Folse have collaborated on a study of the effect of size of city and amount of sales on the margins, expenses, and profits of retail hardware stores in 1923–24–25. The reader is first impressed with the extent to which Mr. Secrist has limited his problem. At the outset he refuses to classify the stores in any way except with respect to size of city and amount of sales. More than 175 pages are devoted by him and Mr. Folse to the analysis of these relations. Mr. Folse's contribution, which covers about 100 pages, may be justified as an exposition of method, which he explains can be applied to other problems.

The economist is often tempted to criticize the detailed mathematical analysis used on data which in themselves are of doubtful accuracy. He asks why spend on the determination of the margins of error time that could be more profitably used in reducing the errors in the original data. The accounting data furnished by the retail hardware dealers, who presumably keep records, may seem excellent when compared with most statistical data. However, the reader experienced in cost studies might like to know more about the original accounts. All that he can learn on this subject in the 175 pages is a few lines in Mr. Folse's section. These lines are as follows:

> *Gross Margin* is the difference between the total net sales and the cost of merchandise sold.
>
> *Total Expense* is the entire expense of doing business. It includes the wages of the proprietor, clerks, and delivery help, interest on the investment and on borrowed money, rent, delivery, and other miscellaneous expenses such as those for heat, light, depreciation, etc.
>
> *Net Trading Profit* is the difference between gross margin and total expense.

How are the wages of proprietors determined? How is investment calculated? How are inventories valued in determining the cost of merchandise sold? It is well known that the allowance for salaries offers the accountant one of his most difficult problems, especially in the merchandising business, where one single proprietor can be personally responsible for the entire success or failure of the business. In calculating investment, as a basis for the imputed interest charge, most business men and many accountants value their assets at market value when they should value them at cost plus the value of actually paid-for improvements. It may very well be that these accounting

items were properly handled, but the reader should have the opportunity of knowing just what was done. Otherwise, he will be reluctant to accept the conclusions of this volume's highly developed mathematical analysis.

According to Table 6 on page 50, in nearly 45 per cent of the store years (extending over 1923–24–25) losses were experienced. Although this percentage might be probable for one year, it is highly improbable for a three-year period. There was only a bare average margin of profit for all the stores during the three years. True, this very narrow margin of profit may have represented a more substantial return on investment than appears, but there are absolutely no data on investment available to the reader. Profits are calculated on sales price and cost, but no data are furnished from which profits on investment can be measured. This ratio is from some points of view a more important one than those calculated in this volume.

KEMPER SIMPSON

NEW YORK CITY

Federal Aid: A Study of the American Subsidy System. By AUSTIN F. MACDONALD. New York: Thomas Y. Crowell Co., 1928. Pp. xii+285.

The Author's Preface indicates that this study was made under a fellowship grant of the Social Science Research Council for a comprehensive field study of the grants made by the federal government to the states (p. vii). This might lead the reader to expect detailed, documented reports on the administration of the federal aid acts under varying conditions. The book consists, however, largely of legislative histories, explanations of the statutes, and descriptions of the administrative machinery set up. Much of this material, based on official and semiofficial reports and bulletins, and congressional hearings and debates, has appeared previously in the author's doctoral dissertation.[1]

The field investigation apparently was not very productive. The interviews with numerous officials and interested citizens yielded many interesting opinions, mostly favorable to the federal aid system. They were supplemented, it seems, by a questionnaire (pp. 177–80). Little evidence is offered in support of these opinions and their value is greatly impaired in any case by their anonymity. A few important illustrations of the administration and, in some cases, of the maladministration of the subventions are cited, unfortunately without any

[1] Austin F. Macdonald, *Federal Subsidies to the States* (Philadelphia: World Printing Co., 1923), p. 122.

reference to the sources of information, although from the circumstances these would seem to be matters of public record (pp. 107–8, 112). The description of these cases in terms of "a mid-western" or an "eastern" state makes it impossible for the reader to study them in the light of the economic, financial, and political conditions of the states, for obviously these vary greatly as between New York or Massachusetts and Vermont, or as between Wisconsin and Indiana.

The author attempts little systematic comparison of the administration of the various acts, or of the administration of specific acts in the various states. The comparisons made are incidental to the general discussion, and are not satisfactorily assembled in the final chapter, with the result that the reader may feel that the conclusions reached are not entirely justified by the facts. The last chapter is chiefly an argument for federal aid discussed in political terms. The problems of the apportionment of funds and the relation of the grants-in-aid to the federal and state financial systems are discussed only in refutation of the arguments advanced against federal aid by Governor Ritchie and others. Yet these problems might well be considered as important as the details of administration. A comparison of federal with state aid would have been valuable, while the literature on state aid might have shown the author the inadequacy of his treatment of the problem.

HENRY J. BITTERMANN

OHIO STATE UNIVERSITY

The Bunkhouse Man: A Study of Work and Pay in the Camps of Canada, 1903–1914. By EDMUND W. BRADWIN. New York: Columbia University Press, 1928. Pp. 306. $5.00.

Do workers in isolated construction camps, such as those of the Canadian railways from 1903 to 1914, get what they produce either relatively or absolutely? asks Dr. Bradwin in one of his illuminating chapters on the actual wages of "the bunkhouse man." It would be hard to find a better illustration than that afforded by these chapters of the "friction" which intervenes in so many practical wage situations to belie the assumptions on which abstract economic reasoning sometimes rolls to smooth and optimistic conclusions.

First of all, we see the misrepresentations of private employment offices and the blandishments of immigrant agents leading many workers to their frontier jobs. There is little here of the reasonably accurate knowledge implied in the concept of free competition. But if the job and the pay and the working conditions are not as advertised, cannot

the men go elsewhere? Not freely, for there are no alternative jobs near frontier construction camps, and the company controlling ferries, food, shelters, and railways on the road back to civilization knows how to make it hard for the man who quits work. The mobility assumed in most abstract reasoning about wages is absent. Most striking of all is the strategic advantage in the hands of the company when it comes to deductions from nominal wages for meals, transportation, medical and postal assessments, and purchases at the company stores. The author gives examples, which he says are typical, to show how a man hiring on at Toronto at "$2 per day" may arrive at the scene of employment considerably in debt to the company. Then there are wet days when pay stops but meal charges go on. At the end of a season there may be only a small balance in favor of the navvy, and the costs of the journey home are likely to take that. "Financially outgeneraled, for the exactions made on him had all been perfectly legal!"

Dr. Bradwin's discussion of the working of the subcontract system and its effect on wages, the housing situation in camps, the social effects of camp life on the men, are equally interesting and instructive. They proceed from a wealth of first-hand information acquired during twenty-four years' experience in frontier places across Canada, participating in manual labor with the men, conducting educational work among them, and later directing the instructors of Frontier College. There is no attempt at psychological analysis such as that which Carleton Parker applied to migratory workers; the book does not deal with industrial disputes, but with the everyday life of the camp laborer during the last great expansion of Canadian railroads.

EUGENE STALEY

UNIVERSITY OF CHICAGO

Politique et Théories Monétaires Anglaises d'Après-Guerre. By JEAN-PIERRE LAZARD. Paris: Société Anonyme du Recueil Sirey, 1925. Pp. v+125.

The late Mr. Lazard regards the monetary policy of England from 1919 to 1925 as the product of a conflict between the interests of industry, on the one hand, and finance and commerce, on the other. The Cunliffe Committee founded its report solely on the desirability of restoring London to its position as an international monetary center and ignored the reactions of its proposed policy upon domestic industry. Under the influence of this report the Bank of England raised its rate of discount in 1919 as the first step toward the deflation of the

currency. Reduction of the volume of currency notes and of the velocity of circulation of bank deposits followed, but only after the economic depression had set in. As might be expected of a French writer, Mr. Lazard emphasises as a distinctive characteristic of British policy during this stage of deflation the efforts made to free the public finances from resort to borrowing. During the period from 1922 to 1924 the domestic consequences of the crisis, in unemployment and loss of profits, strengthened the hands of the industrialists, and increasingly persistent demands for stabilization resulted in its temporary adoption as the basis of monetary policy. The decision to return to the gold standard in 1925 was not, therefore, the result of a sustained effort to follow out the policy of the Cunliffe Committee. It was the result of the reassertion of the "city" point of view at a time when the exchange value of sterling had been raised to par by heavy remittances from New York to London, owing, more particularly, to changes in American banking policy and to the confidence in European investment which followed upon the acceptance of the Dawes Report. Mr. Lazard compares this sacrifice of British industrial interests to the sacrifice of her agriculture to her industry a hundred years earlier. He argues that the decline of industry will deprive London of the large annual volume of savings available for investment upon which basis alone it can remain an important financial center. Ultimately concentration in Great Britain upon trade and finance may, by divorcing its people from reality, restrict their power to act, and, by bringing riches without effort, undermine their morality. While the dominance of traditional attitudes in the recent history of Great Britain, both monetary and industrial, has been the cause of much of her distress, it is easy to attribute too much of the industrial depression to monetary policy and to assign too little as the inevitable consequence of the industrial development and policy of the nineteenth century. Moreover the savings from industry carried on in Great Britain are not the only possible basis for an investment market in London. Nor does the moral future of Great Britain yet appear to be seriously threatened by easy riches from mercantile and speculative activities.

The second section of the book dealing with monetary theory during the same period is seriously lacking in balance in that it is concerned almost exclusively with the theories of Messrs. Keynes and Hawtrey.

Mr. Lazard writes with ease and precision, and his French background gives especial interest to his conclusions and comments.

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